

GPS tags reveal movements of Herring and Lesser Black-backed Gulls along the Belgian coast

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As part of our terrestrial observatory for LifeWatch, the Research Institute for Nature and Forest (INBO) is tracking large birds with lightweight, solar powered GPS tags. The project builds upon the extensive knowledge INBO has acquired over the last 12 years in studying postnuptial migration, and mate and site fidelity of large gulls, using sightings of colour-marked individuals ringed in Belgium.

The GPS tags, which are developed by the University of Amsterdam Bird Tracking System (<http://www.uva-bits.nl>) and funded by LifeWatch, allow us to study the migration patterns and habitat use of the gulls in more detail, and are no longer biased towards locations where observers can see the birds. In 2013, we equipped 25 Lesser Black-backed Gulls *Larus fuscus* (LBBG) nesting in the port of Zeebrugge and 5 Herring Gulls *L. argentatus* (HG) nesting in the port of Ostend with the GPS tags, which automatically record the movements of the gulls over the next few years.

The study is conducted in close collaboration with the Terrestrial Ecological Unit (TEREC) of the University of Ghent, the Flanders Marine Institute (VLIZ) and the University of Amsterdam (UvA). Here we report on the specific movements of one breeding Lesser Black-backed Gull and two Herring Gulls during and after the breeding season, showing how the movements of the gulls vary during the course of the breeding season and fluctuate with tidal movements. The movements are visualized with CartoDB, an open source tool to visualize and analyse geospatial data on the web.

The GPS positions of the LBBG called Eric show that he changes his foraging behaviour to fulfil the growing energetic needs during the breeding season. When still incubating eggs in Zeebrugge, Eric mainly foraged in the agricultural areas to the southeast of the colony. He also made regular trips to Moeskroen, about 65km from the colony site, to feed on potato chips that were declared unfit for human consumption and dumped in containers. After hatching of the eggs and with the growth of the chicks, energy needs rapidly increased and Eric more and more foraged at sea probably to feed on energy rich discarded fish.

During incubation of the eggs in May, Jurgen, a HG that nested on a roof top in Ostend, most often foraged close to his nest (within 10km) mainly at the hard substrates probably to feed on crabs and shellfish. Sometimes he made longer trips to the open sea. During the chick-rearing season Jurgen more often made trips to the sea, up to about 30km from the colony. After his chicks had fledged (August and September) and energy demands decreased his foraging range reduced and he almost exclusively foraged and rested at the hard substrates (jetties) in the vicinity of Ostend. In October Jurgen again changes his foraging strategy and he now regularly feeds inland in the agricultural areas to the southeast of Ostend and less often returns to the colony site.

Finally we show the micro-scale movements of Anne, a HG that nested in Ostend. Even more than Jurgen, Anne was regularly found feeding and resting on the jetties and the beaches near Ostend. If we zoom in on her behaviour clear tidal patterns can be seen. At low tide, Anne used the mudflats and the lower parts of the jetties to feed on arthropods and shellfish. During high tide she rested on the higher parts of the jetties or at the beach.

These analyses use only a small part of the tracking data of the gulls that were received until now. We hope to answer many research questions at multiple scales with the data gathered over the next few years. These data will also be made available as open data to stimulate further use. A subset of the data for the LBBG Eric can already be visualized and downloaded at <http://lifewatch.inbo.be/blog/posts/tracking-eric.html>.