Two-year postdoctoral fellowship

Tracking birds to characterise their use of the Gulf of Lion in the context of renewable energy development

The Tour du Valat is a research institute for the conservation of Mediterranean wetlands based in the Camargue, under the status of a private foundation recognized as a public utility. Founded in 1954 by Dr. Luc Hoffmann, it is at the forefront of multidisciplinary research, building bridges between science, management and public policy, and developing management plans. It has adopted an ambitious mission: "Ensuring the conservation and wise use of Mediterranean wetlands by improving the understanding of their functioning and by mobilising a community of stakeholders"".

The Tour du Valat has developed an internationally recognized scientific expertise; it provides practical answers to the problems of conservation and sustainable management of natural resources.

The Tour du Valat employs about 80 people, including about 15 researchers and as many project managers. It also hosts several other structures on its site, as well as numerous doctoral students, post-doctoral fellows, interns and/or volunteers during the summer season.

More details on https://tourduvalat.org/en/

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Context

The scientific community, environmental associations and managers of natural protected areas have identified a lack of knowledge on how terrestrial migratory birds cross the Mediterranean and how marine birds use the French Mediterranean Sea, particularly in relation to the development of new anthropic activities at sea.
In a context of development of industrial projects in the Mediterranean, including offshore wind farms, it is essential to acquire knowledge to characterize the migratory flows and the functionality of areas at sea for avifauna in the Gulf of Lion, whether for resident or temporally present species.
The MigraLion project proposes to acquire and synthesize knowledge on the spatio-temporal distribution of terrestrial and marine avifauna and chiropterans at the scale of the Gulf of Lion in order to improve the implementation of public policies for the preservation of these species and their natural habitats. In particular, the work package "Telemetry of terrestrial migratory and marine birds" aims to contribute to the acquisition of data to understand the spatial distribution of terrestrial migratory and marine species at sea, and the possible existence of migration routes as well as the flight heights of terrestrial and marine migratory birds at sea. Individuals from 38 bird species are equipped with loggers during the period 2021-2024 with telemetry technology adapted to the size of the species. Miniaturized multisensory loggers (GLS) are fitted on smaller species (Liechti et al. 2018) while GPS/GSM loggers are fitted on larger species (from cuckoos to flamingos).
This work package is implemented by Tour du Valat, Centre d'Ecologie et des Sciences de la Conservation (UMR7204, MNHN), Centre d'Etudes Biologiques de Chizé (CEBC, UMR7372) and Centre d'Ecologie Fonctionnelle et Evolutive (UMR5175).

Duties

We are looking for a highly motivated post-doctoral researcher who will analyse the data collected in order to answer the following questions:

1) Overall analysis of spatial distribution during migration (terrestrial birds) and at sea foraging (marine birds).

   For data from technologies that only allow positioning at large time intervals (GLS or GPS with positions spaced more than one hour apart), the Utilization Distributions (UD) will be calculated by a kernel density method (Worton 1989). For data from technologies that allow positioning at small time intervals (GPS with positions spaced less than one hour apart), the DUs will be calculated by the "biased random bridges" method (Benhamou 2011), which allows to take into account the spatiotemporal autocorrelation intrinsic to longitudinal series. The migration corridors of terrestrial species will thus be directly characterized with the UDs.

2) Flight height analysis

   For terrestrial and marine species tracked by GPS, it will be possible to model bird flight height. We will use statistical methods recently developed to overcome the inaccuracy of GPS-measured heights (Ross-Smith et al. 2016; Péron et al. 2020). For example, one of these methods considers a Bayesian space-state model simultaneously describing two processes: the true distribution of bird flight height according to a lognormal distribution and the GPS error distribution according to a Gaussian distribution (Ross-Smith et al. 2016).

   For small terrestrial species tracked by GLS (mostly passerines), analysis of flight behaviour at sea will derive from the combined analysis of onboard ancillary sensors. The atmospheric pressure (measured in hPa relative to sea level) and temperature sensors (temperature drop of 0.6°C per 100m of altitude) will indicate the flight height at regular time intervals (20 min) during the crossing (Liechti et al. 2018; Jiguet et al. 2019). The accelerometric sensor will provide information on the bird's posture and body movements, allowing the distinction between active flight (flapping flight), passive flight (gliding), and ground phases (resting or feeding) (Williams et al. 2015).

3) Influence of weather conditions during the crossing

   For terrestrial migrants, we will analyse how flight paths and heights for each species, or group of closely related species, are influenced by weather conditions. The variables considered will be wind strength and direction at different altitudinal ranges, atmospheric pressure at sea level, rainfall, insolation (e.g. Vidal-Mateo et al. 2016; Gutierrez Illan et al. 2017; Becciu et al. 2019). The cross-referencing of telemetry data with environmental data will be facilitated by the ENV-Data tools developed in the Movebank database (Dodge et al. 2013). The longitude of the start and end points of the crossing is also likely to have an effect on at-sea behaviour, as will the weather conditions on the days prior to the crossing. We will use generalized linear mixed models (GLMM) or generalized additive models (GAM) to account for individual and seasonal effects.

Qualifications

PhD degree with a specialization in analysing both multisensory (GLS) and GPS data with some experience in ecology and spatial statistics. A professional level fluency in English and a demonstrated ability to use computer programming languages for scientific analysis (such as R or Python) are required. Experience in scholarly publishing is expected.
Speaking French is not mandatory but the candidate should be comfortable with working in a French environment.
Skills in ornithology is not mandatory but would help understanding bird movement with environmental constraints.

Place of work

The position is based at the CEFE in Montpellier and at the Tour du Valat in Arles, with an expected 6 months per year at each site. Both cities are located in the south of France, approximately one hour from each other.

Expected Productions

- A minimum of two articles in international peer-reviewed ecology journals are expected.
- Participation in an international symposium.

Supervision

Jocelyn Champagnon will be the supervisor for Tour du Valat. He is currently the coordinator of the Species Conservation team, which leads and promotes the long-term monitoring programmes carried out by Tour du Valat.

Olivier Duriez (CEFE, assistant professor at the University of Montpellier) is one of the coordinator of MigraLion project. He studies movement ecology of birds using GPS technology.

Frédéric Jiguet will be the MNHN correspondent for the scientific project. He is MNHN professor at CESCO, and deputy director of CRBPO. He develops research on bird migration, both marine and terrestrial, using telemetry technologies (GPS tags, geolocators).

Form of employment

Fixed-time employment (2 years).

Starting date

Starting date is 1st September 2022, but some flexibility can be arranged.

Application

To apply please submit i) a cover letter summarizing research interests and expertise; ii) a CV including a list of publications; names and contact information of two references, all in a single pdf document sent to daubigney@tourduvalat.org

Application deadline is 1st July 2022. The pre-selected candidates will be invited for an interview by videoconference.

References

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