High-resolution tracking of fledged Yelkouan Shearwaters exposes post-fledging migration

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The first year of life of Procellariiformes is an understudied period during which juveniles fledge independently and carry out their first outward migration. We present post-fledging and migratory tracks of Yelkouan Shearwaters *Puffinus yelkouan* from Malta, Central Mediterranean.

Methods

OrniTrack-9 GPS-GSM devices on 5 adults & 15 juveniles → Migrations of 3 adults & 14 juveniles

Individuals molecularly sexed.

EMbC classification of GPS positions into (a) **floating**, (b) **extensive search**, (c) **intensive search**, or (d) **relocation** based on velocity and turning angle (Garriga et al. 2016).

Fig. 1 Juvenile Yelkouan Shearwater fitted with a GPS-GSM device.

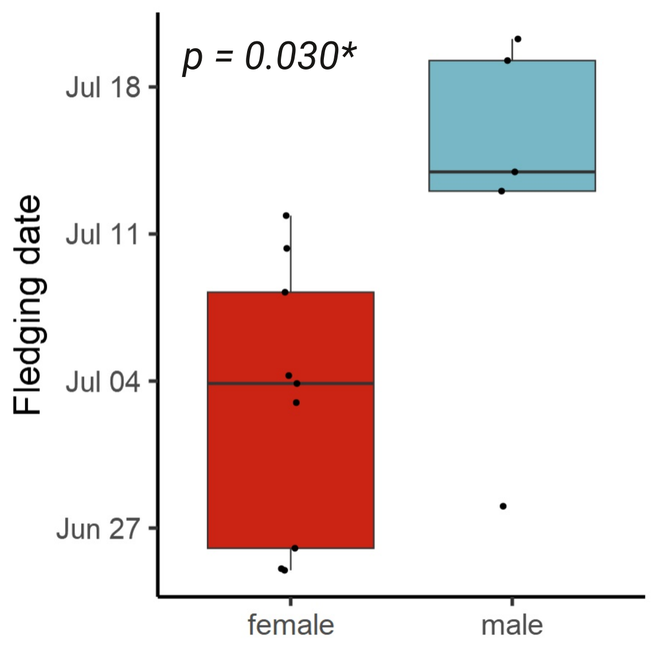

Fig. 2 Fledging dates of female (n = 9) and male (n = 5) Yelkouan Shearwaters.

◀ Female juveniles fledged 10 ± 4 days earlier than males (*Fig. 2*). One juvenile failed to fledge and another washed up dead in Egypt 16 days after fledging. Transmission durations were similar between juveniles (4 - 41 days) and adults (4 - 44 days).

▶ On fledging, juveniles spent most of their time floating on the water before starting their migrations (*Fig 3*). Their post-fledging spatial distribution reflects known non-breeding destinations of adult Yelkouan Shearwaters (Raine et al. 2013).

◀ Movement trajectories of Yelkouan Shearwaters travelling into the Aegean demonstrate the difference between **navigation** - adults take a directed route to the Strait of Kythira - and **orientation** - juveniles met the Greek coast then moved south along it to enter the Aegean (*Fig. 4*).

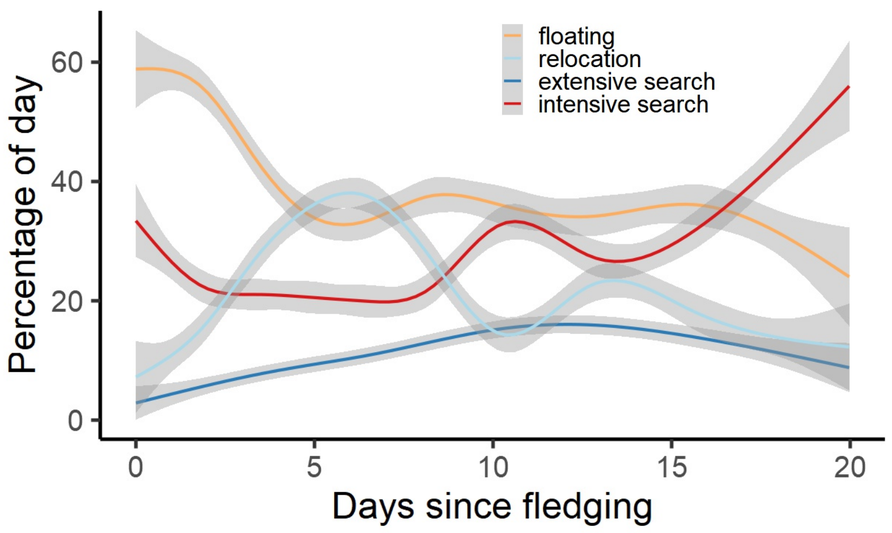

Fig. 3 The proportion of each day juveniles spent in each of four behaviours (EMbC output) after fledging.

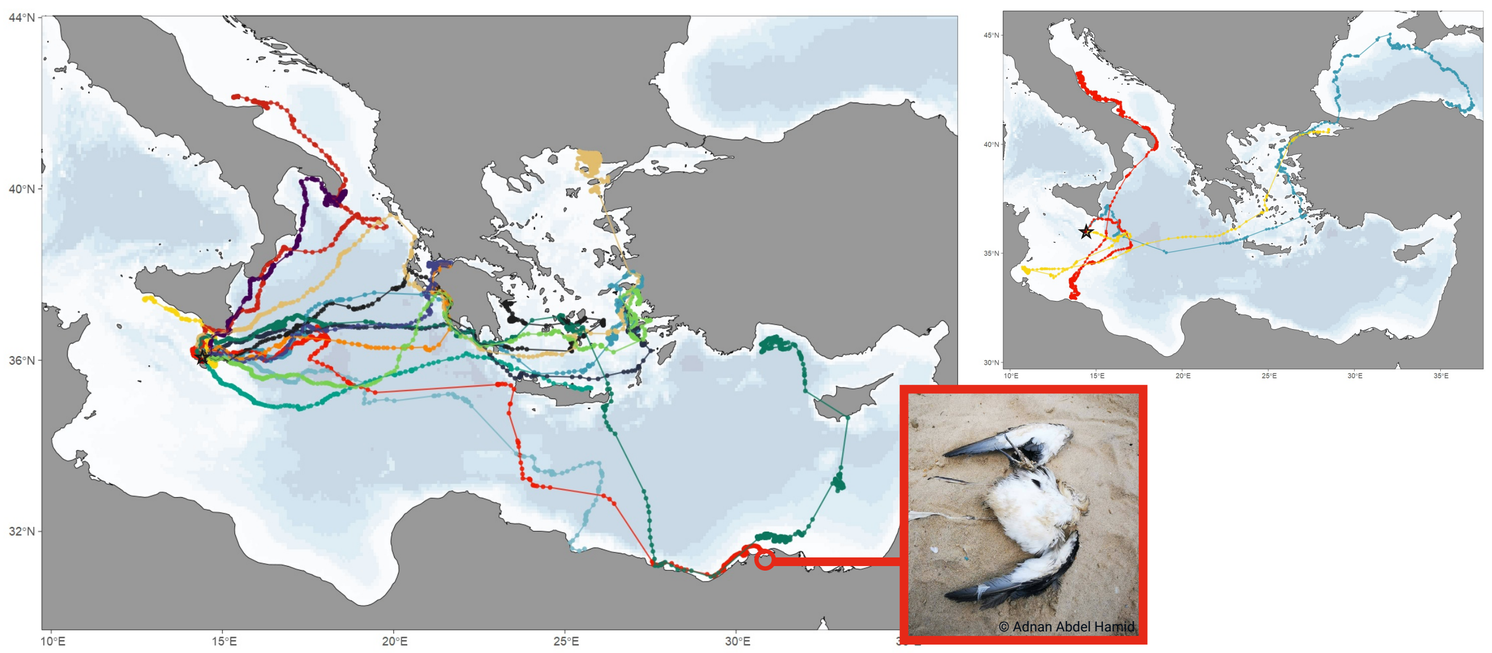

Fig. 4 Left Post-fledging movements of 14 juvenile Yelkouan Shearwaters (4 - 41 days). **Right** Migrations of three adult Yelkouan Shearwaters. Black stars represent colony location, Malta. **Inset** Juvenile washed up dead on the coast of Egypt.

References

Garriga J., Palmer J.R., Oltra A., Bartumeus F. (2016) Expectation-maximization binary clustering for behavioural annotation. *PLoS ONE 11*: e0151984.

Raine, A.F., Borg, J.J., Raine, H., Phillips, R.A. (2013) Migration strategies of the Yelkouan Shearwater *Puffinus yelkouan*. *Journal of Ornithology 154*: 411–422.

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