Bound together or loose ends? Foraging association in Red Knots

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Do knots have 'friends'? ATLAS tracking might have answers

Waders such as red knots *Calidris canutus* are highly social, and gather in large non-breeding flocks in the Wadden Sea, where they feed on the macrozoobenthos buried in intertidal mudflats. Knots have been shown to use social information in lab settings[1], and are hypothesised to use communal roosts as information centres[2].

Persistent association with specific individuals could help knots make use of collective sensing, or exploit an informed flockmate. We used high frequency *(1 minute interval)* ATLAS[3] tracking data to test whether knots have non-random associations — in a sense, do knots have 'friends'?

[1] Bijleveld et al. 2015. *Behav. Processes*
[2] Bijleveld et al. 2010. *Oikos*

[3] Time of Arrival radio tracking using 4.2 g tags glued to dorsal surface; 5-point median filter applied.

Knot association is low, but 10% of knot pairs are 'friends'

We found that of 556 unique knot pairs tracked over 44 tidal intervals *(high tide to high tide, ~19 days)*, ~10% were associated *(proportion of positions in proximity)* higher than expected by chance. 10% were associated less than expected.

Association is largely environmentally driven

Within tidal intervals, knot association was highest in the hours just before *(advancing tide)* and after *(receding tide)* high tide, and lowest around low tide (Fig. 1).

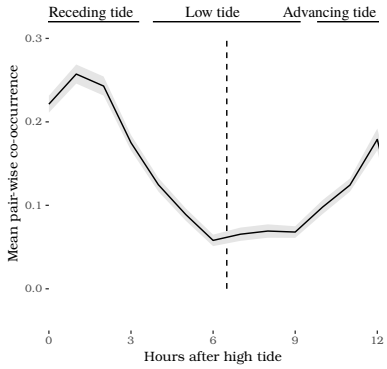

Figure 1: *Mean pair-wise association over the tidal interval ± 95% CI. Low tide at dashed line.*

Personality may matter more than identity

Our results align with the idea that wader flocks are good examples of random mixing driven by environmental effects[4] — possibly, individual presence is sufficient to inform about the resource landscape without individual identity being key.

Red knots have been shown to have consistent individual differences in exploratory behaviour, which may be linked to different foraging needs and movement patterns[5]. It remains to be tested whether knots are more discriminating about the *kind*, rather than identity, of individuals with which they associate.

[4] Myers 1983. *Behav. Ecol. Sociobiol.*; Conklin & Colwell 2007. *JOFO.*

[5] Bijleveld et al. 2014. *Proc. Royal Soc. B.*