

# Bound together or loose ends?

## Foraging association in Red Knots

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### Do knots have ‘friends’? ATLAS may provide 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,<sup>1</sup> and are hypothesised to use communal roosts as information centres.<sup>2</sup>

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<sup>3</sup> tracking data to test whether knots have non-random associations — in a sense, do knots have ‘friends’?

### Knot association is low, but 10% of 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, Kolmogorov-Smirnov test) 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).

### Conclusion & future work

Our results align with the idea that wader flocks are good examples of random mixing driven by environmental effects.<sup>4</sup>

However, red knots have been shown to have consistent individual differences in exploratory behaviour, which may be linked to different foraging needs and movement patterns.<sup>5</sup> It remains to be tested whether knot personality is a factor in determining association in the dynamic Wadden Sea landscape.

<sup>1</sup> Bijleveld et al. 2015. *Behav. Processes*

<sup>2</sup> Bijleveld et al. 2010. *Oikos*

<sup>3</sup> Time of Arrival radio tracking using 4.2 g tags glued to dorsal surface; 5-point median filter applied.

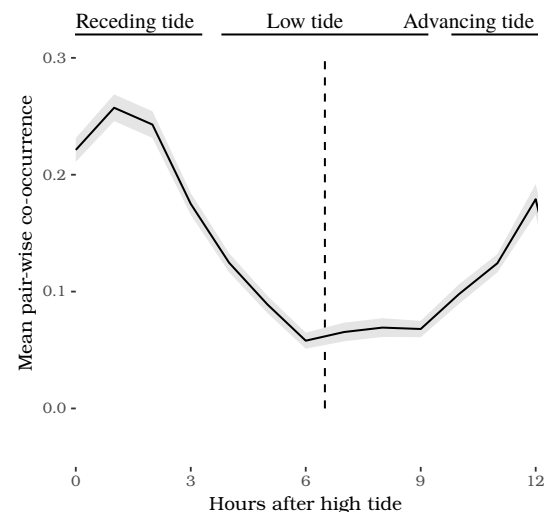


Figure 1: Mean pair-wise association over the tidal interval  $\pm$  95% CI. Low tide at dashed line.

<sup>4</sup> Myers 1983. *Behav. Ecol. Sociobiol.*; Conklin & Colwell 2007. *JOFO*.

<sup>5</sup> Bijleveld et al. 2014. *Proc. Royal Soc. B*.