

# 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.

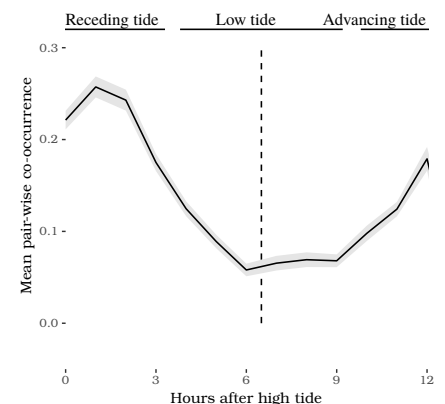


Figure 1: Mean pair-wise association over the tidal interval  $\pm$  95% CI. Low tide at dashed line.

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

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