Diving and foraging behaviour of seabirds in a high-energy tidal stream: implications for encountering tidal stream devices

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INTRODUCTION

• Diving seabirds may encounter and collide with tidal turbine installations while foraging underwater.
• The consequences of collisions has the potential to impact on seabird populations, which there is a legal requirement to assess.
• For birds with foraging and diving preferences within high energy tidal streams the devices may have important behavioural and ecological implications.
• Studies have found different species exploited different states of the tidal cycle [2]. However, our knowledge base on how they utilise high-energy tidal streams (HETS) in a UK context is still very limited [3, 4, 5].

METHODS

• We undertook behavioural observations from three vantage points along the length of Bluemull Sound, Shetland (fig. 1).
• Observations were carried out in summer 2011, winter and summer 2012.
• Data collected included >1,000 focal observations; during each observation the location and duration of behaviours were recorded.
• Data are being analysed with tidal current speed and direction data, collected through an Acoustic Doppler Current Profiler (ADCP) deployed in Bluemull Sound in 2004.

RESULTS

• Initial analyses suggest that diving frequency in some species, such as puffin show significant correlation with the mean current speed (mean current speed, \( p = 0.014 \). N=114, dev. explained =51.8%; fig 2).

AIM

To develop our understanding of seabird foraging and diving behaviour under different tidal conditions within a high-energy tidal stream.

Figure 1. Vantage points in Bluemull Sound

Figure 2. Atlantic puffin diving frequency by mean current speed (m/s). Binomial GAM: Dive frequency ~ Focal duration + mean current speed

CONCLUSIONS

• Our initial findings show that diving frequency varies under different tidal conditions. A better understanding of these preferences can help inform a species’ sensitivity to tidal developments and any impact assessments. For example:
• Species that dive more frequently in faster flows are more likely to encounter a tidal device at maximum velocity. Similarly, preferences for currents at certain depths can determine a species’ sensitivity to the location of turbines within the water column.
• Our study highlights the importance of focal observations in understanding behavioural usage of tidal environments. We suggest these observations can provide context to site abundance and density estimates, and can give an indication of turnover within development sites. This can lead to a more accurate assessment of the impacts of marine renewable energy developments.

KEY REFERENCES


Bluemull Sound

Stonesmore

Bolamor

Sh_xmlen

Lund

Figure 3. An illustration of a “feeding conveyor-belt” [2]; the blue line indicates the direction of tidal current flow and red line, bird movement.

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