Going where modern technology cannot: novel adaptions of conventional approaches to record seabird behaviour and fish communities in tidal stream environments

J.J Waggitt[1] & S. Fraser[2]

[1] School of Ocean Sciences, Bangor University, Anglesey, UK, LL59 5AB
[2] NAFC Marine Centre, University of the Highlands and Islands, Shetland, UK, ZE1 0UN

Background

This project aimed to methods that document and understand the diving behaviour of cormorants and shags in tidal stream environment. Unlike existing approaches, which usually involve expensive and sophisticated methods, the methods developed within this project were inexpensive and practical, facilitating their applications in risk assessment. To meet these aims, methods were developed using existing knowledge on species behaviours, and appreciation of information needed for risk assessment: dive duration, diving intensity (area searched, dive frequency), dive consistency, dive location and foraging patterns. It was hoped that that methods would also increase understanding of variation in collision risk amongst locations by identifying associations between physical characteristics, prey communities and behaviour.

Method Development

Three methods were developed to measure bird dive behaviour, prey communities, and bird foraging patterns: a binocular-camcorder setup, modified fish traps and time-lapse units. The binocular-camcorder setup ('bino-cam') mounted rangefinder binoculars, an activity logger and a camcorder together on a tripod. When operated from a coastal vantage point (VP) with known coordinates and altitude, this setup allowed the position and times of dives to be estimated, whilst also providing a video for reference/checking. The modified fish-traps were based on commercially available designs and adapted for use in high flow environments in both seabed and floating configurations. Five strings of four traps each were rigged for deployment and recovery using a cost-effective fishing vessel. The Time-Lapse setups were either off-the-shelf Browning Trial Cameras, or custom-made units combining second-hand DSLR cameras and a solar panel. The former is used when cameras can be positioned within or immediately along the roosts, whereas the latter were used when cameras can only be positioned several hundred meters from roosts.

Preliminary Results

The Covid-19 suspension of fieldwork in Shetland from April 2020 to April 2021 provided opportunities to develop the bino-cam at local coastlines <1mile from the School of Ocean Sciences, Bangor University. Whilst obtaining useful measurements of dive-behaviour, an MSci student project also highlighted some issues with the bearing and tilt measurements in the original unit mounting, which was rectified before travelling to Shetland. Whilst in Shetland, 2 observers performed approximately 70hr observations in 9 locations, collecting around 30hr of footage from +300 birds. Footage is currently being analysed, and preliminary outputs are provided alongside this report. The modified fish-traps were successfully deployed and recovered in key locations overlapping in space and time with VP observations and captured nine species of fish and a variety of crustaceans and echinoderms without any losses of gear. The unexpected delay to fieldwork also provided inspiration to develop the Time-Lapse setups, which were not planned at the onset. Several equipment-tests (days to several months) were performed at locations <5 miles from the School throughout 2020 and 2021, successfully capturing variations in the numbers of roosting birds. We are working with Computer Sciences staff at Bangor University to develop artificial intelligence (AI) to automate the counting of birds from thousands of images, identifying patterns in foraging behaviour. In September 2021, these units will be permanently deployed at 4 locations, hopefully establishing long-term monitoring.