Migration Routes of Birds in Relation to Current and Proposed UK Wind Farm Sites.

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The Wildfowl & Wetlands Trust (WWT) has been using conventional PTTs and, more recently, GPS PTTs to describe the migration routes and flight patterns of migratory waterbirds for more than a decade. Early work, undertaken in collaboration with Prof. Colin Pennycuick at the University of Bristol in the mid 1990s, tracked Whooper Swan migration between Scotland and Iceland to assess the flight performance of a large bird making a long overseas crossing. More recently, satellite transmitters have been used to describe the migration phenology, key staging sites, breeding distribution and fine-grained use of wintering sites for the east Canadian Light-bellied Brent Goose *Branta bernicla* population (since 2002), the Svalbard and Greenland Barnacle Goose *Branta leucopsis* populations (since 2006 and 2008 respectively) and the Greenland White-fronted Goose *Anser albifrons flavirostris* (in 2008) (see www.wwt.org.uk/research/tracking/maps.asp for more details).

Photo by David Hickson

Whooper Swans in flight.

These studies have enabled WWT staff to develop considerable expertise in the fitting of satellite tags, with the welfare of the birds being of paramount importance. However, none of these projects have been on the scale of that currently being undertaken. In winter 2008/09, forty solar powered 70g GPS PTTs were deployed on Whooper Swans across three WWT Wetland Centres: at Welney in southeast England (15 tags), at Martin Mere in northwest England (20 tags), and at Caerlaverock in southwest Scotland (5 tags). A further 10 birds are scheduled to be fitted with satellite transmitters in Iceland in August 2009, as part of the same study. Since the tags are solar powered, they should yield information on the swans' migration in autumn as well as in spring. An engineer was commissioned and asked to use WWT designs to produce a special plastic base-plate, within which the 70g units were mounted. This had the dual benefit of maximising the battery recharge rate (by ensuring that the solar panels were not covered by the swans' plumage) and, more importantly, of improving the fitting of the transmitter to the swans and thus ensuring the welfare of the birds.

The main aim of the current project, which is being funded by COWRIE (Collaborative Offshore Wind Research into the Environment), is to describe the flight paths of Whooper Swans migrating through Britain, including over its estuaries and coastal waters. In particular, it aims to determine the extent to which the swans pass within areas already containing, or proposed to contain, offshore wind farm developments and the extent to which time of day and weather conditions affect these routes. Because geese and swans tend to fly at less than 100m above ground or sea level, even during migration, it is thought that they could be at risk of collisions with wind turbines, especially in conditions of poor visibility such as at night or in rain and fog. The large sample size, which is unusual for a satellite tracking project, should give us confidence in our conclusions and in extending them to the population as a whole (~26,000 birds in 2008). The project pushes the abilities of the solar powered tags to their limit at this latitude in the UK in winter, with fixes being obtained every hour from 18:00 through the night to 11:00 the next day, from 8 March to 16 May inclusive, in order to cover the spring migration in as much spatial and temporal resolution as possible. As swans often travel between 80–110 kph, longer time intervals between fixes could result in a lack of data for key stages of the migration. At least two birds crossed from northern Scotland to Iceland in just under 12 hours.

By the end of April 2009, 90% of the tagged swans had completed their migration from Britain to Iceland. The transmitters not only provided frequent and accurate data on the swans' migration routes, which will be analysed over the summer, but also illustrated a general division in the migration routes and potential breeding sites used by the swans wintering in different parts of the UK. The highly detailed GPS data will also allow the home range characteristics, particularly movements between feeding and roosting sites, to be analysed for individual swans at their wintering grounds and spring staging sites. As with previous tracking projects, WWT has encouraged local schools to get involved by championing the swans and following their progress online at www.wwt.org.uk/flywiththeswans.

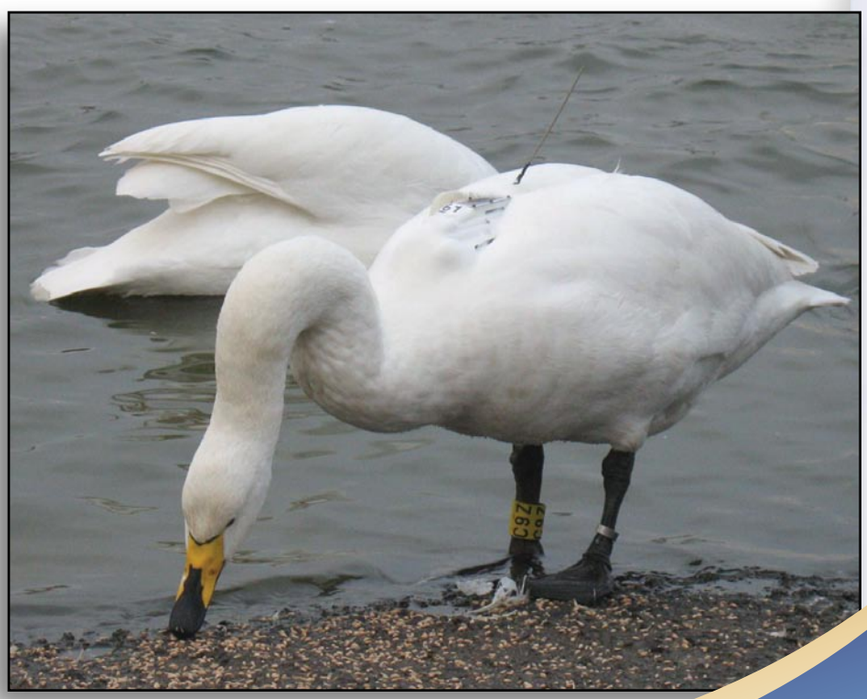

Photo by WWT

Whooper Swans with PTT.