

# Movements of GPS-tracked Curlews within the New Forest and The Solent

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*Curlew, New Forest (Marcus Ward)*

## **Summary**

Three Eurasian Curlews were fitted with GPS-GSM tags at sites spread across the New Forest in late May/early June 2018. This comprised part of the New Forest & Solent Curlew Project, established to provide data on habitat use and movements of Curlews whose breeding and wintering numbers are declining in Hampshire. High-quality data were delivered on brood ranges, off-duty feeding locations and use of coastal sites. This small initial sample of individuals clearly highlights the importance of feeding sites for adult Curlews up to 12.5 km from the breeding site and functional linkages with The Solent coast and fields at the edge of the New Forest. An issue of premature tag loss has now been addressed and continued tagging of more birds in winter and spring will rapidly increase our understanding of Curlews using the New Forest and The Solent, with implications for their conservation.

## Background

The Eurasian Curlew *Numenius arquata* (hereafter Curlew) is a species of high conservation concern, having undergone a 49% decline in numbers in the last 25 years in the UK. It has been red-listed in the UK since December 2015. It has been argued that the Curlew should currently be considered the UK's most pressing bird conservation priority given its global status (Near Threatened), the significance of the UK breeding population and the rapid decline in that population (Brown *et al.* 2015).

At a workshop on Curlew hosted by WWT at Slimbridge in February 2017, it became apparent that the relative importance of issues facing local breeding populations is likely to vary regionally and that better information on fine-scale habitat use and predation pressure was required from a range of sites. The New Forest is one of four remaining strongholds for lowland breeding Curlews in England along with the Brecks, Upper Thames meadows and Severn Vales, but we currently have a very poor understanding of the habitat use and survival rates of these birds.

## The New Forest breeding population

The historical context of the New Forest breeding population in terms of numbers of territories is summarised in Table 1. It clearly increased substantially from the late 1800s to the 1960s, probably peaked in the 1980s to early 1990s and has suffered a sharp decline since about 2000. A volunteer-based survey co-ordinated by Russell Wynn in 2016 (Wynn 2016 & 2017) covering 86 sq. km of New Forest bog, heath and mire found just 40 pairs. Repeat surveys of 31 one km grid squares surveyed in 1993/94 and 2004 showed a dramatic decline in the population after 2004.

**Table 1: New Forest Curlew breeding population**

Year	Population estimate (pairs)	Derivation, notes	Reference
1880s	1-2		Kelsall & Munn (1905)
1930s	Increasing population		Cohen (1963)
1957	27		Cohen (1963)
1960	60	Based on count of 44	Cohen (1963)
1966	58	Based on count of 29 in 63 sq km	Cohen & Taverner (1972)
1981-84	120		Tubbs (1986)
c.1993	120	Considered same as 1980s	Clark & Eyre (1993)
1993-94	90	Estimate revised down from counts suggesting 132	Tubbs & Tubbs (1994). RSPB contract survey.
2004	99	Based on 33 in 31 sq km surveyed	Goater <i>et al.</i> (2004). RSPB New Forest Breeding Wader Survey.
2014	123	Considered an over-estimate by local birders	Gates 2014. RPS New Forest Breeding Wader Survey commissioned by New Forest National Park Authority and The Verderers.
2016	40	Possibly 50 in 2016 reported at one stage but revised down to 40 pairs	Wynn (2016). Wild New Forest & Forestry England survey.
2017	42		Wynn (2017). Wild New Forest & Forestry England survey.

Little is known about the wintering locations of Curlews breeding in the New Forest, but one individual that was colour-ringed in France on 26 September 2014 has been seen on

territory at Howen Bottom, near Fritham in spring 2016, 2017 and 2018. In autumn-winter 2016 and 2017, this bird was resighted close to where it was marked just south of La Rochelle.

## **The Solent wintering population**

The Greater Solent area (comprising Pagham Harbour, West Sussex, The Solent and its harbours and the north shore of the Isle of Wight) together with Poole Harbour, Dorset supports >1% of the European wintering Curlew population and 8.5% of the UK wintering population within the Greater Solent or 10% including sites west to Poole Harbour. The Hampshire Solent's wintering population has fallen dramatically from c.4000 individuals in the 1980s to just 2,300 in the period of the Hampshire Bird Atlas 2007-2012 (Eyre 2015). Consequently, we have an increasing responsibility and urgent need for research into and conservation of the Hampshire Curlew populations.

## **Threats to New Forest and Solent Curlew populations**

Curlews in Hampshire are likely already being affected by human-induced pressures, although evidence for their effects is currently limited. We suggest that the main factors which could be important are as follows:

- Pressure from increased recreational disturbance, with dog walkers (often with dogs off leads), walkers and cyclists all off main paths and through Curlew territories. The situation is likely to get worse with an increasing human population and major house building schemes within easy reach of the New Forest.
- High levels of predation of nests and chicks leading to low productivity, probably caused by both mammals (e.g. Fox *Vulpes vulpes*, Badger *Meles meles*) and birds (e.g. Carrion Crow *Corvus corone*). There may be an interaction between human disturbance and predation rate.
- Decreasing availability of suitable coastal fields used by Curlews as they are lost to, or threatened with, developments and/or surrounded by housing schemes. Frequent disturbance, particularly by dog walkers, of unprotected wet pastures and arable fields upon which Curlews depend for feeding throughout the winter may also be important.

## **Objectives of the New Forest and Solent Curlew study**

The New Forest & Solent Curlew Project aims to understand the rapidly declining New Forest breeding population and the declining and threatened wintering populations. Through helping identify the key habitat and site requirements, we can better inform statutory authorities and conservation organisations on appropriate management and help advise the planning system. We have a national and international responsibility for the species and must better understand its ecology and conservation needs.

Whilst one recent study of Curlew ringed in winter has indicated a high annual adult survival rate (Taylor & Dodd 2013), very little is known about movements of Curlew between inter-tidal and inland feeding areas in winter and the impact of increased recreational disturbance and housing development, especially in The Solent. This may result in the loss of essential feeding sites and consequently in reduced adult survival. We need data on a fine spatial scale to establish which fields wintering Curlews favour and whether they are faithful to certain fields or groups of fields. This could be significant for conservation as Curlews form part of the SPA (Special Protection Area for birds) assemblage and are listed in the SPA citation for eastern harbours. The terrestrial sites have no designations, but must be considered integral to the SPA. Without data we can't help with their protection from possible housing developments and recreational disturbance. The importance of meadows and arable fields around The Solent may be greatly underestimated and undervalued.

We envisaged a five-year project, starting with tracking of three Curlews in the New Forest in spring 2018 and followed by tagging of up to ten Curlews during winter 2018/19. Solar-



**Figure 1. (a) Curlew on its nest (Shane King); (b) Colour-ringed female Curlew (Pete Potts)**

powered GPS-GSM tags have the advantage that they relay very accurate locations (c.8-15 m accuracy) via the mobile phone network. Tag life is expected to be 3-4 years, enabling data collection on breeding and winter habitat use from the same individuals in different years.

Backed up with an additional sample of colour-ringed individuals, our aims are to:

- 1) Determine fine-scale habitat use by breeding adults and broods in the New Forest.
- 2) Assess the frequency of use and seasonal dependence on feeding sites outside the Forest by Curlews breeding in the Forest.
- 3) Measure nest site fidelity of individual Curlews.
- 4) Gain a better understanding of the use and importance of terrestrial habitats around The Solent for wintering Curlews.
- 5) Determine the breeding origins of migrant Curlews visiting The Solent for winter.
- 6) Measure and compare survival rates of local breeders with the wintering Curlews and contrast with other UK studies and projects in continental Europe.

## Methods

Three adult Curlews were trapped on the nest with the purpose of fitting GPS-GSM tags (Figure 1(a)). A male was caught at Duck Hole (between Brockenhurst and the A35) and a female at Strodgemoor Bottom (near Burley) on 25th May 2018. A second male was caught near Ferny Crofts (Beaulieu Road Station) on 7th June 2018. The birds were tagged from four days before hatching to the day of hatching. All were colour-ringed with individual combinations (Figure 1(b)) and fitted with Movetech Telemetry Flyway-I8 GPS-GSM tags under a BTO Special Methods licence. Tags were fitted so that they sat on the lower back using a modified Rappole-style leg-loop harness (Sanzenbacher *et al.* 2000). GPS location data were relayed to and stored online at the Movebank repository. Tags were initially programmed to transmit once an hour between 07:00 and 19:00 and four times during the night, but solar charging was sufficient to allow collection of data at 30 minute intervals during daylight hours once chicks had hatched.





**Figure 2. (a) Curlew nest with eggs (Andy Page); (b) Recently hatched young (Shane King)**

## Results

Bird safety and data obtained. No issues were encountered with tag attachment and fit of the harnesses. All birds flew on release and returned to the nest within ten minutes. Each bird was re-sighted several times, behaving normally for at least a week after tagging. The GPS-GSM tags worked as expected yielding position fixes as scheduled. All three of the tagged birds hatched their clutches (Figure 2). We believe the birds lost their broods when 9-15 days old because the adults suddenly moved to The Solent coast before the young reached fledging age, although we have no direct evidence of predation. It is possible that the tagged female's brood survived longer because females often leave the male to raise the brood after about two weeks, but we were unable to confirm an outcome for this brood. The Duck Hole male and Strodgemoor Bottom female moved to Poole Harbour on 9th June and 11th June, with the Ferny Crofts male moving to the coast east of Lymington on 16th June. The tags indicated that the birds were alive and moving around in these coastal areas.

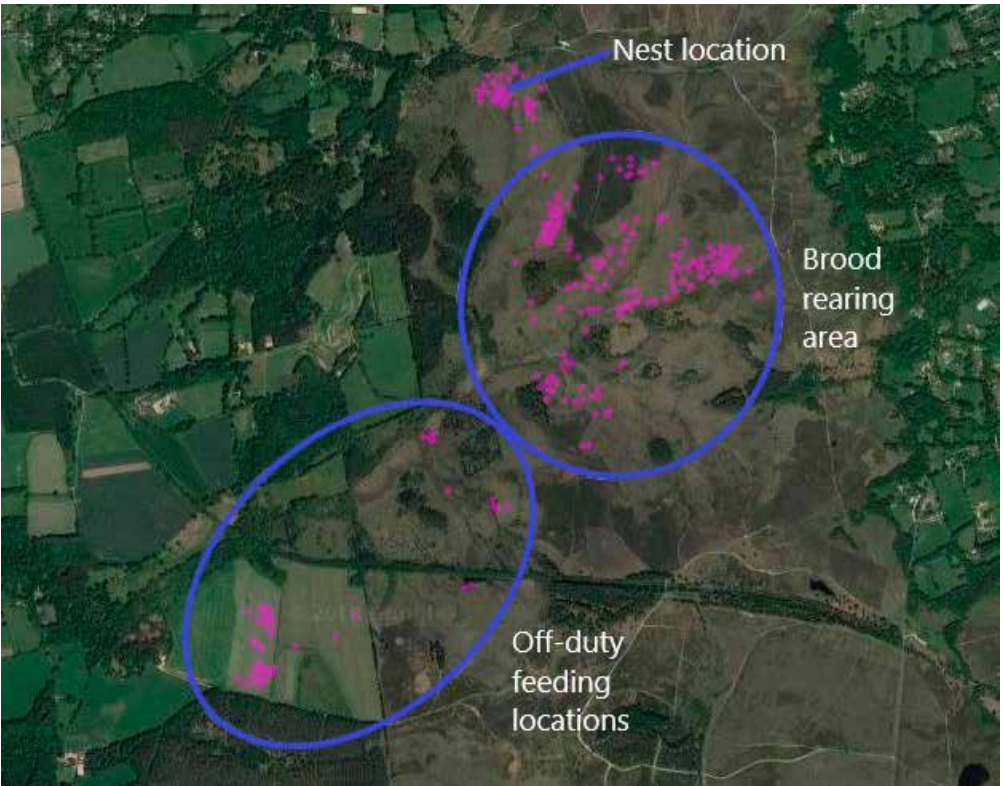
Data transmission ceased for these birds on 19th June, 29th June and 7th July respectively (25-35 days after tagging and 10-21 days after moving to the coast). We subsequently retrieved one of the tags and have evidence that the harnesses failed but that the birds were alive. One of them was regularly seen wintering (identified from its unique colour-ring combination) at Lytchett Bay, Poole Harbour and was seen in the Avon Valley in March 2019. All three were seen back on breeding territories in 2019.

## Brood ranges

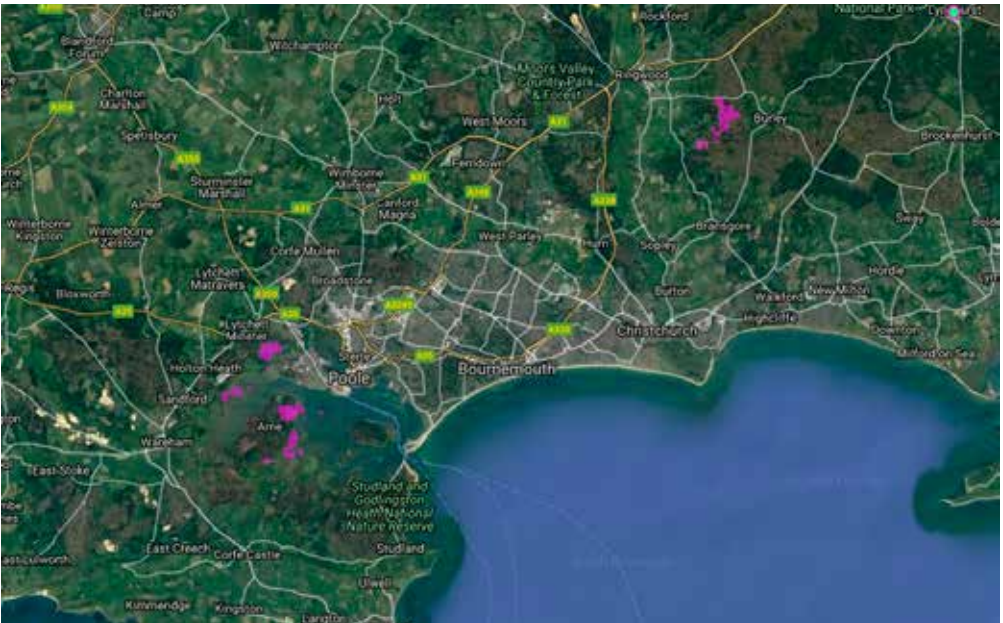
All three broods used wet mire habitats. The Duck Hole brood ranged over c.60 ha, the Strodgemoor Bottom one over c.65 ha after making a movement of about 500 m in the first two days after leaving the nest, and the Ferny Crofts one covered an area of c.50 ha. Several sightings of alarm-calling birds were made to confirm locations and the presence of chicks.

## Off-duty feeding sites

All tagged birds left the vicinity of the nest or brood on most days to visit sites away from the breeding area. This was presumably for feeding and we conclude that the mire habitats, whilst providing good availability of food for chicks, did not provide a good source of larger



**Figure 3.** Locations of the Strodgemoor Bottom female over the two weeks following tagging. (Landsat/Copernicus image © Google Earth).



**Figure 4.** Locations of the Strodgemoor Bottom female showing use of different parts of Poole Harbour during mid to late June. (Landsat/Copernicus image © Google Earth).

prey for adult Curlews. The Duck Hole male flew 1.0-3.9 km to inland feeding sites on heath and grassland and regularly 12.5 km to feed on the coast at Lymington. The Strodgemoor Bottom female flew up to 2.0 km to heathland feeding sites when off duty and regularly flew 2.3 km to one particular field on the eastern edge of Bisterne Estate (Figure 3). On a visit to this field for visual confirmation of the bird's location, six feeding Curlews were observed. The Ferny Crofts male flew 1.0 km to feed on a wet mire within the Forest, but more regularly 10 km to an inlet on the coast south of Sowley Pond.

## **Coastal sites**

The two males visited the coast while their broods were still alive. The Duck Hole male used the Lymington coast and then moved to Brands Bay in Poole Harbour once its brood failed. It continued to use a relatively small area there until it shed its tag. The Ferny Crofts male visited the inlet near Sowley regularly while its brood was alive and then moved to Lymington once it had lost its brood. The Strodgemoor Bottom female flew to Poole Harbour following breeding and used several parts of the harbour until shedding its tag (Figure 4).

## **Further work**

The loss of tags was frustrating, but we are now clear on the reason for this. All birds appeared to behave normally following tagging and yielded valuable insights into brood movements, the use of off-duty feeding sites and connections with the coast. We now have a solution for the tag attachment issue and are confident that tags can be attached safely without further issues. Planned fieldwork has subsequently continued, with tagging of three Curlews on the coast in January 2019 and two further birds in the New Forest in spring 2019.

It is important that we continue to build up a larger sample of tagged individuals. With this we will start to classify habitats from the combination of satellite imagery and measures recorded in the field. We plan to test for differences from random habitat use during the breeding season and winter using coarse categories from imagery. We will then use measures of vegetation type and height, and soil dampness or penetrability, recorded in the field at locations used by tagged birds, to examine fine-scale requirements by comparison with measures at random locations.

Now that we have more experience of catching Curlews in the breeding season, we intend to increase the number of colour-ringed individuals. Cohorts of individually colour-ringed birds will be built up in both the New Forest and The Solent to help establish adult survival rates. This will take several years and we hope that reporting rates will be sufficient to enable marked birds to be followed and their life-histories established. Our aim is for data of sufficient quality to run analyses of annual survival rate and to compare with other estuarine complexes and breeding populations.

As well as providing necessary information on Curlew requirements at a local level, the data will complement work at sites elsewhere in the country and could be used in a combined analysis with data from other tracking projects to help answer over-arching questions on Curlew populations.

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