Surprising Dispersal Ecology of Hen Harriers in England

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The hen harrier *Circus cyaneus* is a vulnerable and declining breeding species in England. A highly productive, but isolated population in the Bowland Fells, Lancashire, England is not consolidating, or providing immigrants to an ailing and almost extinct subpopulation spread out across northern England.

In February 2002, I started my dream job with the Hen Harrier Recovery Project for Natural England. The focus of my research was to find and monitor nests, assess productivity and then examine post-natal dispersal strategies using radio telemetry and wing tags. It soon became apparent that we were attempting to study a quite amazing, ultra-mobile, unpredictable and opportunistic raptor. The methods at our disposal were fraught with researcher/observer biases and the collected data, based on radio tracking and wing tag observations, although very valuable, were mainly from areas we could access using vehicles and from coastal areas where most people watch birds in the UK outside of the spring and summer months.

Photo by Les Steele

The intrepid male 73584 age 10 months.

The dispersal ecology of the hen harrier in England had not been previously studied, primarily due to its rarity, wide-ranging partial migratory traits and high mobility. After 5 years of intensive fieldwork, we concluded that productivity was high enough to maintain a viable and expanding population, but this was not happening. It was therefore critical to increase the knowledge by undertaking detailed examination of the post breeding, first winter and return to breeding ground periods as this largely unknown part of their lives is where the key limits to population growth will exist. To compound the naturally occurring limiting factors, the species is persecuted by gamekeepers as it is a predator of gamebirds including red grouse *Lagopus lagopus*, "Blue Riband" quarry species in the UK.

A more accurate and continuous representation of hen harrier dispersal was required. It would be possible to locate the areas where the birds frequent at different times of the year and then focus our resources in these areas. The radio tracking data was hinting that the modal dispersal direction was to the east and northeast of the study site; this was not expected, as this was a continuation of the upland landscape in which they breed.

In 2007, I read about 9.5g MTI PTTs that were helping to provide unprecedented knowledge of the dispersal ecology of hobby *Falco subbuteo* and woodcock *Scolopax rusticola*. Funding was made available for 15 PTT 100's. I fitted these in June and July 2007 using modified Teflon backpack harnesses to point-of-fledge juveniles. This was repeated in 2008 and 2009.

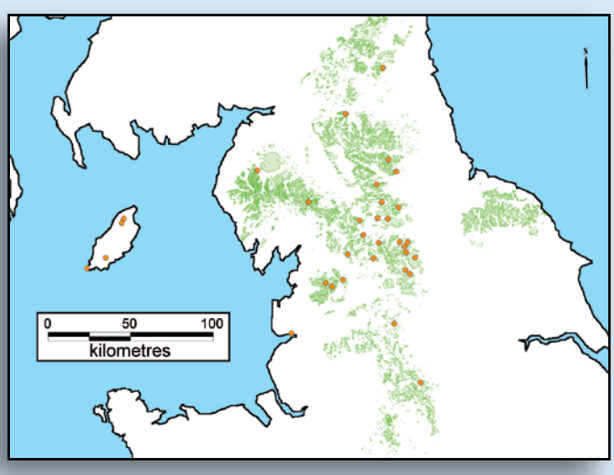
Much of the older and some of the more recent literature infer that hen harriers breed in the uplands and then disperse (usually south) to lower altitudes and coastal areas outside of the breeding season. The development of lightweight PTTs has allowed this to be tested and provided valuable data on the birds' utilisation of the landscape.

It is now apparent that the English Hen Harriers have complex dispersal strategies; there are notable differences between sexes, age groups and individuals. Approximately 86% of the year's juveniles of both sexes disperse away from their natal areas, utilising the Pennine mountain range as dispersal corridors to access areas used for game management, particularly driven red grouse shooting.

Some individuals, usually females, become quite sedentary staying in their upland natal areas; others, especially males, are more mobile. For example, male 73584 covered at least 14,420 km^2 between June 2008 and May 2009, tracked 186 km to the south and 140 km to the north of his natal area, and utilised land from sea level to 2500 ft. In contrast female 73587 displayed typical dispersal behaviour and covered only approximately 760 km^2 during the same period, not located beyond 40 km of her natal area and always above 800 ft asl. During the non breeding season males used an average of 15 km^2 per day to forage, considerably more than females (5.5 km^2).

It is now evident that certain areas in the English uplands regularly attract hen harriers. Interestingly, birds from different provenances have visited these discrete locations almost synchronously. Some siblings may wander many kilometres away from each other during dispersal and then reconvene at these important areas to the north and east of the study site. These are predominantly upland habitats, previously unknown to the conservation organisations as important dispersal corridors and winter foraging areas for hen harriers.

Birds fitted with transmitters in 2007 are still providing data in 2009. Birds have been tracked back to their natal areas and become successful parents, allowing me the opportunity to fit satellite tags to offspring of tagged birds to test for sociality during dispersal. We now know considerably more about hen harrier's spatio-temporal use of the landscape but there is still much to learn. The next stage is to find out exactly what is causing the extraordinarily high first winter mortality rates. Satellite data has shown that the majority of hen harriers from England breed and winter in the uplands in inland locations and helped to identify the locations of approximately 12 communal roosts and 10 important areas for hen harriers in the uplands of northern England.



During the non-breeding season birds generally avoid the coasts and stay faithful to the uplands (green). Orange spots show the harmonic mean locations of study birds between August and February 2007 – 2009.