

# Provision of nest cages to reduce little ringed plover *Charadrius dubius* nest predation at Welney, Norfolk, England

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## SUMMARY

At a site in eastern England, wire mesh cages were placed over little ringed plover *Charadrius dubius* nests to protect their eggs from predation. The adult birds continued incubating their eggs and no nest desertions were attributed to cage placement. Protection with cages resulted in an increase in productivity, measured as fledged young per pair (1.6 young fledged per pair in protected nests, 0.6 per pair in unprotected nests). Provision of nest cages, in conjunction with extending suitable breeding habitat, has resulted in a gradual increase in numbers of breeding little ringed plover pairs over a 10 year period.

## BACKGROUND

In 1970, a wetland area known as Welney, part of the Ouse Washes in eastern England, was established as a reserve by Sir Peter Scott. The Wildfowl and Wetlands Trust now manages 405 ha of the Washes. The wet grassland habitat here is designated a Wetland of International Importance, a Site of Special Scientific Interest (SSSI), and a Special Protection Area (SPA).

For many years only one or two little ringed plover *Charadrius dubius* pairs attempted to breed but were usually unsuccessful. Eggs and chicks of these small ground-nesting waders are vulnerable to predators. Two water birds, moorhen *Gallinula chloropus* and coot *Fulica atra*, were initially identified as the main culprits for nest failure, both seen in the act of predating nests. Coots have also been observed at the site destroying numerous redshank *Tringa totanus* and avocet *Recurvirostra avosetta* clutches, as well as killing wader chicks. Corvids (Corvidae), red foxes *Vulpes vulpes*, stoats *Mustela erminea*, weasels *M. nivalis* and American mink *M. vison* are also implicated in predation of waders and their eggs and chicks.

The little ringed plover is a rare and local breeding species in the UK. Therefore, in an attempt to enhance their breeding success at Welney, nests were protected with a wire mesh

cage. These cages had holes large enough to allow easy access by the plovers but small enough to prevent most predators from entering.

## ACTION

**Study site:** The peaty wet grassland on the Ouse Washes at Welney, Norfolk, eastern England, is not classic breeding habitat for little ringed plovers. The site is a shingle-starved landscape, whilst little ringed plovers usually nest on open shingle-covered habitat often close to water, such as margins of gravel pits. Little ringed plovers were first encouraged to the site almost by accident when they started to occasionally nest on two small man-made shingle islands, and also on a nearby shingle covered shoreline in front of the Main Observatory and viewing facility. The original purpose of laying shingle was both decorative and to suppress plant growth in front of public viewing hides. Following this, up to three further locations around the pool where nesting had been observed, received small dumper-trunk loads of shingle. These were spread 1-3 m from the water's edge.

Additional to the purposely created shingle patches, little ringed plovers were also occasionally breeding on areas of bare mud or dead, flattened grass left after winter or spring flooding.

**Nest cages:** Protective nest cages for little ringed plovers were first used in the spring of 1996. The cages were made entirely from strong sheets of 5 cm-square meshed wire. The mesh of the cages is sufficiently small to keep out larger predators such as corvids and foxes; however small predators, such as stoats and weasels, and even small American mink, are still able to enter. The cages used are 61 x 61 cm x 30.5 cm high. Two entry/exit holes (10 cm high x 5 cm wide) were made on each of the four sides of the cage to allow a quick exit if required. This was achieved by simply snipping off a 5 cm cross piece of wire at a height of 5 cm from the ground. In the early days when experimenting at Welney with different entrance/exit sizes, a moorhen was seen reaching in and breaking and eating the plover eggs when a larger 10 x 10 cm entrance was used. The entrances/exits were normally situated at either 10 or 15 cm from the cage corners, though the exact distance is probably not critical. However, the little ringed plovers were also small enough to be able to pass through the 5 x 5 cm mesh (see Consequences, below).

In some instances cages were secured to the ground by two short lengths of metal reinforcing rods driven into the underlying substrate at opposite corners of the cage. This was to prevent the cages being knocked over by larger wildfowl e.g. mute swans *Cygnus olor*, Canada geese *Branta canadensis* and shelduck *Tadorna tadorna*. Securing of cages was not deemed necessary where the only other neighbours were breeding waders or common terns *Sterna hirundo*.

**Positioning of cages:** In the early years, a tentative approach to cage placement was taken. Cages were placed approximately 2 m from the nest for 24 h before being positioned over the nest the following day. After a couple of years it was found that cages could be placed directly over the nests as soon as they were located with no adverse effects to the incubating birds noted. Often birds would be back incubating within a few minutes of cage placement.

As the little ringed plovers mostly used the shingle patches or islands for nest sites, this made nest location and hence protection, much easier. From 2000 onwards some very small shingle patches (about 65 x 65 cm square) with a cage already in position were placed out in early spring. The shingle proved very attractive and by 2005 up to five pairs settled down in

these pre-set cages. The obvious advantage of pre-positioned cages was that clutches are protected immediately from the time of laying, and not from when a nest happens to be found. Also one can influence nest location to avoid possible flood locations or other hazards. These nests did need to be checked once laying commenced in case clutches were not positioned centrally, but near the cage edge where a predator could reach them. A slight repositioning of the cage solved this problem.

**Monitoring:** Nests were generally only visited on around three or four occasions, e.g. to initially place a cage if not pre-positioned; to confirm clutch size; to establish if eggs had been predated; or to confirm hatch success. Most nests were also visible from existing bird watching hides which made observation of the success of individual broods usually easy to monitor. In a location without hides it is more difficult to follow the progress of chicks as the appearance of humans quickly results in alarm calling parents and chicks hiding. For all nests that were found a British Trust for Ornithology (BTO) Nest Record Card was completed to assist in national censuses for the species.

## CONSEQUENCES

**Nest cage success:** In all cases little ringed plovers continued to incubate when a cage was positioned over their nest. There were no cases of desertion attributed to cage placement.

Before the implementation of nest cages (1984-1995), an average of 1.3 pairs bred annually and 0.8 young fledged per year (Table 1). In 1996, one nest was protected, which resulted in three fledged young. The other nest of that year was not protected and failed twice. Over the 10 year period in which cages were used, in comparison with earlier years when nests were unprotected, the number of chicks fledged per pair per year was more than twice as high for the protected nests.

For most years there was no problem with cages being dislodged, but in 2005 a fox dug under one cage to get at the clutch. It is possible that the cage in this situation may have actually attracted the fox, and therefore it might have been better left unprotected. However, this would have left it prone to the attentions of other predators. As a rule of thumb, a non-island nest, if it is well away from water and thus the usual moorhen/coot foraging areas, may best be left unprotected.

**Table 1.** Summary of nest cage placement and little ringed plover fledging success at Welney, 1984-2005.

Year	Pairs/year	Chicks fledged/year	Chicks fledged/pair/year	No. of nests protected	Comments
<b>Nests not protected</b>					
1984-91	1	0.4	0.4	0	0-2 (average 1) pairs a year; only 3 young reared in entire period
1992	1	0	0	0	
1993	2	0	0	0	
1994	3	5	1.6	0	
1995	2	2	1.0	0	
<b>Average</b>	<b>1.3</b>	<b>0.8</b>	<b>0.6</b>		5 breeding attempts by 2 pairs
<b>Nest protected</b>					
1996	2	3	1.5	1	1 of 2 nests protected
1997	2	0	0	1	1 known nest flooded
1998	6	8	1.3	3	5 clutches hatched
1999	8	15	1.8	7	fox predated one caged nest
2000	9	9	1.0	13	8 nests flooded; 4 pairs re-laid
2001	10	18	1.8	8	
2002	12	25	2.2	12	11 pairs bred
2003	10	16	1.6	10	
2004	8	11	1.3	10	first nests flooded
2005	9	18	2.0	9	fox dug under one cage
<b>Average</b>	<b>7.6</b>	<b>12.3</b>	<b>1.6</b>		

**Note:** Number of nests protected can be higher than number of pairs when repeat attempts are also protected.

**Behavioural changes:** Once pairs were settled under cages obvious behavioural changes were frequently observed in their reaction to the close proximity of both moorhens and coots. Typically both of these species are mobbed and much distraction display exhibited when they approach to within approximately 10-15 m of a nest. However, many incubating little ringed plovers in cages allowed moorhens and coots to feed within a metre of the cage with no reaction and appeared to recognise that they were safe. Black-headed gulls *Larus ridibundus* have been seen perching on cages with the incubating plover within seemingly unperturbed.

Cages also allowed successful breeding to occur amongst colonies of larger, aggressive species such as avocets.

**Provision of entrance/exit holes:** Little ringed plovers are small enough to be able to enter and exit through the 5 cm-square mesh used

for the cage construction. Therefore, it might be unnecessary and even, better, to not cut holes in the mesh, as this provides bigger entrances for predators. However, during ten years of cage use at Welney, plovers were never seen to use anything but the 10 x 5 cm holes provided. When a cage is first positioned over a nest plovers walk around the perimeter looking for a way in and invariably choose the larger hole provided. Lack of an easy access might prevent more cautious individuals from entering, but this has not been tested; moorhens and coots, the main predator species at Welney were effectively prevented access by the 10 x 5 cm entrance holes.

**Conclusions:** After the implementation of nest protection cages fledging success per nest attempt increased. The average number of young fledged annually on the site was 15-times higher than the unprotected nests during 1984-95. Flooding became the main cause of nest failure.