Nest box provision for lesser kestrel *Falco naumanni* populations in the Apulia region of southern Italy

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SUMMARY

Renovation of historic buildings and measures to limit access by feral pigeons *Columba livia* var. *domestica* has a strong negative impact on some lesser kestrel *Falco naumanni* populations by reducing nest site availability thus lowering reproductive success. In order to test the efficacy of nest boxes as a means to mitigate for such loss of nesting sites, we studied the occupancy rate of roof-top nest boxes and compared their performance to that of 'natural' nests (i.e. located in cavities in bulidings and under roofs within buildings). Of 200 nest boxes provided, 16 (8%) were used for breeding in the first year (2007) and 35 (17.5%) in the second year (2008); it is expected that occupancy will increase substantially in subsequent years. In 2007, the number of fledged young produced/pair in nest boxes (1.82 young) was similar to that of attic nests (1.66 young), whilst those nest located with cavities (2.70) had a much higher reproductive output. In 2008 the number of fledged young produced/pairs in nest boxes was 1.54.

BACKGROUND

The lesser kestrel *Falco naumanni* is a colonial nesting species which breeds in cavities in rocky cliffs and on man-made structures (Vlachos *et al*. 2004). It is one of the most endangered birds in Europe (BirdLife International 2004), with recent declines attributed to habitat degradation and loss of nest sites. In parts of its breeding range it is closely tied to man, nesting primarily within urban centres in old buildings (Negro 1997, Bux *et al*. 2005); this is the case for colonies in Apulia and Basilicata (southern Italy), where instances of breeding in rural or natural habitats are extremely rare due to a lack of suitable nest sites (Palumbo 1997). Some of the main threats to populations breeding in Mediterranean countries (Franco *et al*. 2005, Catry *et al*. 2007) and especially in the historic town centres of southern Italy, include building renovation which lead to the closure of cavities in walls and roofs, and efforts to limit access by feral pigeons *Colomba livia* var. *domestica* (Sigismondi *et al*. 2003). Building renovation may cause the loss of entire broods if renovation efforts take place during the lesser kestrel nesting season (through destruction of the nest site or disturbance leading to dessertion by adult birds), and ulitmately reduces the number of potential nesting sites by eliminating suitable cavities, ledges and overhangs. The goal of this present work was to mitigate for the loss of nest sites by providing roof-top nest boxes and to i) quantify the occupancy of the nest boxes by lesser kestrels, and ii) compare the reproductive parameters of pairs breeding in nest boxes with those breeding in 'natural' sites such as cavities in walls and attics of old buildings.

ACTION

Study area: The lesser kestrel nest box provision was undertaken in five small/medium-sized cities in the provinces of Bari and Taranto in the Apulia region of southern Italy, under the "One house for lesser kestrel: practical actions for the conservation of the Lesser Kestrel *Falco naumanni* in Apulia" project financied by Peretti Foundation of Rome. In these five cities (see below), which support 55% of the Italian lesser kestrel population (Spagnesi & Serra 2005), the birds breeds mainly in cavities in walls, under roofs and in attics of old buildings.

Provisioning of nest boxes: From 22 Febraury to 30 March 2007, a total of 200 nest boxes were provided for lesser kestrels in four cities within the province of Bari: Gravina in Puglia (n=102, 51% of the total); Altamura (n = 50, 25% of the total); Acquaviva delle Fonti (n = 22, 11% of the total); and Cassano delle Murge (n =12, 6% of the total); and one in the province of Taranto: Laterza (n = 14, 7% of the total).

Nest boxes were placed on flat roofs of private and public buildings, both in historic town centres and in modern neighbourhoods, in the vicinity of areas where lesser kestrels were known to nest. The boxes (each 10 kg in weight) were constructed of fir and pine wood: the base was 45 cm x 55 cm; 15 cm in height at the front and 25 cm at the rear; the roof jutted out by 5 cm to guide any rainfall away from the box base. In one side there was 9 x 9 cm panel that could be opened in order to view the box contents. Each box had a single 6 cm diameter entrance hole located at the front of the box - this size hole allowed lesser kestrels access to the nest boxes but excluded feral pigeons and other larger birds (Fig. 1).

Inside each box was added about 1 cm depth of soil, both to provide a soft substrate for the eggs to be laid upon and to prevent eggs from unecessarily rolling. The nest boxes were secured directly onto the floor of the selected roof-top terraces.

Nest monitoring: In 2007, in order to compare the main reproductive parameters (clutch size, egg-laying date, hatching sucess and reproductive succes [number of fledged young/pair that laid eggs]) between nest boxes and natural nests (i.e. in attics or wall cavities) 58 nests located in the colonies in Gravina in Puglia and Altamura were examined: 27 (47%) were in attics 20 (34%) in nest boxes, and 11 (19%) in cavities.

All nest boxes and natural sites were checked at least twice between 15 May and 20 June 2007 to see if they were occupied by lesser kestrels. In 2008, nest boxes only were likewise checked. A nest was considered occupied when at least one egg was laid. The main egg-laying period is between 15 to 30 May (Bux *et al*. 2005). In order to gather reproductive parameters, active nests (in particular those in nest boxes) were investigated four or five times throughout the two breeding seasons.

Figure 1. Lesser kestrel roof-top nest box.

CONSEQUENCES

Nest box occupancy: The occupancy rate of the 200 nest boxes installed in spring 2007 was 8% (16 boxes) in 2007 increasing to 17.5% (35 boxes) in 2008. A further 39 boxes (19.5%) in 2007 and 77 boxes (38.5%) in 2008 were visited by lesser kestrels but not used for nesting (Table 1).

Clutch size, hatching success and fledging success 2007: Clutch sizes were very simialr between nest site locations. Nests in attics had an average clutch of 3.81 ± 1.36 (Mean ± SE) ((*N* = 27) eggs, nests in cavities had an average clutch of 4.00 ± 0.77 (*N* = 11) eggs, whilst those in nest boxes had an average clutch of 3.95 ± 1.10 (*N* = 20) eggs.

Of the three nest types, cavity nests had the highest hatching success averaging 3.10 ± 0.74 (*N* = 10) chicks, compared to nests in attics (2.52 ± 1.31, *N* = 23 hatched eggs) and nest boxes (2.32 ± 1.56, *N* = 19 hatched eggs).

In terms of reproductive success (i.e. number of fledged young produced/pair), there were significant differences between nests in attics and nest boxes, compared to those in cavities. The latter fledged on average 2.70 ± 0.82 young per pair (*N* = 10), which was higher than for the other two nest types: attics 1.66 ± 1.14 (*N* = 18) and nest boxes 1.82 ± 1.47 (*N* = 17).

Clutch size, hatching success and fledging success 2008: Nest boxes had an average clutch of 3.31 ± 0.99 (*N* = 116) eggs (slightly lower than in 2007). Hatching success of 2.06 ± 1.35, (*N* = 72 hatched eggs) and reproductive success of 1.54 ± 1.22 (*N* = 54) were likewise a little lower than in 2007. Clutch size, hatching success and fledging success is not statistically different from 2007. No comparative data with other nest sites is available.

Conclusions: The occupancy rate by lesser kestrels of the nest boxes in 2007 (8%) was not particularly high but increased to 17.5% in the 2008 breeding season. From previous studies of lesser kestrel use of nest boxes, occupancy in their first year of placement is never high and it is often takes two or three years for them to be fully accepted by the birds. This trend is evident from the nesting data of this present study, and has previously been observed in other studies in Spain and Portugal (e.g. Pomarol 1996, Catry *et al*. 2007), and in Italy during studies on the breeding biology of the Santeramo in Colle colony; occupancy rates were 12% in the first year, 38% in the second year and 58% in the third year (Bux *et al*. 2005). It is hoped that in the 2009 breeding season that nest box occupancy will increase further.

Table 1. Summary of nest boxes visited and occupied by lesser kestrels in 2007 and 2008, installed in Gravina in Puglia (Ba), Altamura (Ba), Acquaviva delle fonti (Ba), Cassano delle Murge (Ba) and Laterza (Ta), southern Italy.

Site:	Gravina in Puglia	Altamura	Acquaviva delle Fonti	Cassano delle Murge	Laterza	Total
Number of boxes installed	102	50	22	12	14	200
2007						
Visited by lesser kestrels	30 (29.4%)	2 (4.0%)	6 (27.3%)	0	0	39 (19.5%)
Occupied by lesser kestrels	11 (10.8%)	2 (4.0%)	3 (13.6%)	0	0	16 (8.0%)
2008						
Visited by lesser kestrels	40 (39.2%)	18 (36%)	6 (27.3%)	0	4 (28.6%)	77 (38.5%)
Occupied by lesser kestrels	21 (20.6%)	8 (16.0%)	3 (13.6%)	0	3 (21.4%)	35 (17.5%)

Catry *et al*. (2007) suggest that well-designed and appropriately placed nest boxes could provide better quality nesting sites than natural ones, particularly with regards to protection from predators and reducing interspecific competition for limited nesting sites, thus providing an effective conservation measure for lesser kestrels by enhancing reproductive output. In this present study, a comparison of the main breeding parameters between three different types of nesting sites (nest boxes, attics and cavities) found that reproductive success was slightly better in nest boxes than those nests situated in attics, whilst cavity nesters performed best. However, nesting success was broadly comparable. It may have been, at least in part, that reproductive success in nest boxes was lower than in cavities as more experienced pairs were nesting within traditionally used cavities, and uptake of the boxes was mainly by younger birds.

In conclusion, this project shows that wooden nest boxes are effective in mitigating for the loss of traditionally used nesting sites of lesser kestrels and that they can be used successfully in cases in which rapid intervention is necessary, such as, for example, when nest sites are lost due to building renovatation.

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