

Creation of artificial sand martin *Riparia riparia* burrows at Kingfishers Bridge, Cambridgeshire, England

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SUMMARY

In 1995, holes were drilled into the face of two low limestone cliffs created to provide breeding habitat for sand martins *Riparia riparia*. In 1996, the first breeding season that the holes were available, sand martins did not nest in the burrows, probably as they were not wide enough to allow the birds to turn around within them. The limestone was too hard for them to dig a widened nest chamber themselves. Creation of a slightly enlarged nest chamber using a water jet rectified this problem. Since 1997 about 30 sand martins have bred annually.

BACKGROUND

In 1995, 61 ha of arable farmland at Kingfishers Bridge, eastern England, were converted into a wetland, consisting of fens, reedbeds and a mere. Once the wetland was established, flying insects were abundant in spring and summer, and attracted foraging sand martins *Riparia riparia*. Sand martins nest in holes, which they usually excavate themselves, within sandy river banks, earth banks and quarries. Although, Kingfishers Bridge is well suited for foraging sand martins, there was no available breeding habitat. Therefore, the objective was to provide suitable breeding sites by creating two small cliffs and drilling nest holes into the exposed rock face.



Figure 1. The larger limestone cliff (3 m high x 80 m long) with a pool in front to deter predators.

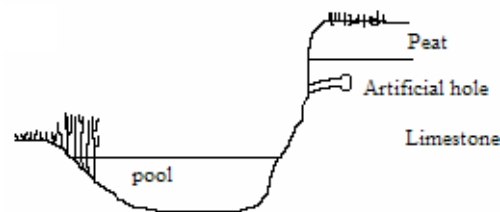


Figure 2. A schematic drawing of a cliff with a pool in front. The top layer of the cliff consists of peaty soil which overlies the limestone bedrock. In the limestone the artificial nest burrows were drilled. An enlarged nest chamber was created using a high pressure water jet.

ACTION

In 1995, two areas of soft Corallian limestone bedrock and overlying soil were exposed and excavated to create two small cliffs. The larger cliff (Fig. 1) is 3 m high and 80 m long. A pool of 1,600 m² with a depth of approximately 1 m was dug in front of the cliff to deter potential predators, such as stoats *Mustela erminea* and weasels *M. nivalis*. At various heights, but at least 1 m above the water surface, about 130 holes (about 5 cm diameter and 60 to 90 cm long) were drilled into the limestone using a

Table 1. Numbers of breeding pairs of sand martins at both cliffs (1996-2007), and numbers of breeding pairs (1999-2007) and broods (2003-2006) of common kingfishers at the small cliff.

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Sand martin pairs	0	c.8	10	>30	c.50	c.50	30	25	14	16	20	<10
Common kingfisher pairs (& broods)				1	1	1	1	1 (2)	1 (2)	1(2)	1(2)	1(3)

Kango drill. The tunnels were drilled at a slight angle upwards to ensure that any water seeping through the limestone flows out of the holes. A profile of the cliff is shown in Figure 2. The smaller cliff is 3 m high and 60 m long with an 800 m² pool excavated in front of it, also with a depth of approximately 1 m. Fifty holes were drilled in the same manner as the larger cliff. Both cliffs are north facing.

Once the sand martins returned in the spring of 1996, it was noticed that they were entering the holes but that they could not turn (as they would normally do in nest holes excavated by themselves) and therefore had to back out of them. In this year they did not use the burrows for breeding, perhaps as a result of the burrow design. Thus in the autumn of 1996, a high pressure water jet was inserted into each hole with the objective of creating a cavity at end of each tunnel in order to achieve sufficient space for the birds to turn. It was hoped that this would create a burrow very similar to that excavated in softer substrate by the birds themselves, thereby encouraging nesting.

CONSEQUENCES

Since 1997, sand martins have nested annually in these artificial burrows (Fig. 3). The number of breeding pairs fluctuates each year (from around 8 to c. 50), but overall about 30 pairs have bred annually (Table 1). The burrows are also used by common kingfishers *Alcedo atthis*. Annually, a single kingfisher pair has bred in the small cliff, these rearing two broods, and occasionally three, per breeding season.

Holes in natural cliffs are usually excavated in soft sand, which will often quickly erode. Thus at such sites holes are re-excavated regularly, this process resulting in a fresh, clean nest burrow and chamber. The holes drilled in the

limestone cliff will remain for many years which might be a problem as they may be prone to a build up of bacteria and parasites. One consideration is therefore to clean the holes artificially.

Washing holes: In the winter of 2000 all the holes were washed out using a water hose. No difference in sand martin breeding behaviour could be detected the following spring. In 2002, half of the holes were cleaned and half left to serve as an 'uncleaned control'. The following breeding season equal numbers of breeding pairs were observed nesting in both the cleaned and the control holes.



Figure 3. Sand martin parent and chicks in one of the artificial nest holes at Kingfishers Bridge.

Observations suggest that there are more breeding sand martins using the cliffs in dry springs compared with wet ones. This might

indicate that the holes are too humid in wet years as limestone absorbs water, and therefore it is likely that the holes remain moist. Hence, cleaning the holes with water might not be the appropriate method. Plans are underway to incorporate better drainage in the holes. A possibility is to line the limestone at the end of the tunnels with sand and gravel.

Conclusions: The creation of the two limestone cliffs and drilling of artificial nest burrows has successfully attracted sand

martins to nest at Kingfishers Bridge. Breeding followed the enlargement of the nest chamber by using a high pressure hose in 1996, subsequent to a lack of uptake earlier that summer. Since 1997, burrows have been used annually by approximately 30 breeding sand martin pairs. Additionally, a kingfisher pair has bred annually in the artificial burrows. In years with wet springs fewer sand martins have used the burrows. This might indicate that drainage is inadequate therefore improvements are being considered.