



## Time of roosting of Barn Swallows *Hirundo rustica* at an Irish reedbed during autumn migration

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Barn Swallow *Hirundo rustica* roosting time was studied at a south-coast Irish reedbed during 2003 to 2006. Roosting time varied between 11 and 35 minutes after sunset. There was no significant difference in roosting time after sunset across years. Roosting time (relative to sunset) was later in July than in August and September. The time interval between roosting of the earliest and latest birds usually spanned a period of about 10 to 15 minutes, but could be as long as 30 minutes. The light intensity at the time of roosting varied between 41 and 6 lux.

Barn Swallows *Hirundo rustica* (subsequently referred to as Swallows) are common and widely distributed as breeding birds in Ireland (Hutchinson 1989). They are trans-Saharan migrants, wintering in the Republic of South Africa and Namibia (Mead 2002). Although not considered threatened in Ireland, they have been placed on the 'Amber List' there due to an unfavourable conservation status on the European mainland (Newton *et al* 1999). However, they are not globally threatened, although there have been considerable local and regional fluctuations throughout their European and American ranges (Turner 2004).

Communal roosts of Swallows are formed within Europe before the breeding season is over, in the African winter quarters and elsewhere, and roosts often include Sand Martins *Riparia riparia* and other species. These roosts may contain from a few birds to several thousand and exceptionally two to three million birds, the largest numbers occurring within their winter quarters (Rudebeck 1955, Curry-Lindahl 1963, Cramp 1988, Turner 1994, 2006). Roosts are often situated in beds of Common Reed *Phragmites australis*, but other wetland vegetation may also be used, as well as trees, and crops of Maize *Zea mays* on agricultural land (Cramp 1988, Turner 1994, 2006). Urban sites, including ledges on buildings, are used in Asia (Ewins *et al* 1991). Although the phenomenon of communal roosting in Swallows has been known for a long time, many authors restrict themselves to describing it in a general way, often dwelling on the spectacle of the large numbers and the behaviour of birds pre- and post-roosting (Rudebeck 1955, Curry-Lindahl 1963, Loske 1984).

Swallows are often captured for ringing (and other studies) at communal roosts during autumn migration (eg Ormerod 1989, Rubolini *et al* 2002), and determining the most opportune time to do so is important. Here we

address the questions of time of roosting (relative to sunset) and light intensity at time of roosting in a systematic way, a subject that has received little attention to date.

### METHODS

#### Study site

Ballyvergan Marsh is an extensive coastal reedbed situated near Youghal, County Cork, Ireland (51°56'N 7°54'W). The dominant vegetation consists of Common Reed, but other wetland vegetation occurs on the periphery. A series of drainage ditches, in varying states of disrepair, occur within the reedbed, as does a disused railway line running east to west which provides access to the centre. Here, catching and observations were undertaken during the autumn migration period in the four years 2003–06.

#### Catching and observation

The data used in this study were collected during catching and ringing operations for the British Trust for Ornithology (BTO) Swallow Roost Project (Griffin & Clark 2003). In each year the study began on 1 July and ended on 9 October, by which time all Swallows had deserted the site. On each of 105 catching attempts one 18 m standard-height four-shelf mist net was set in the same place along a path and across a drainage ditch within the reedbed. The mist net was usually set about 30 minutes before sunset. A cassette tape-lure of Swallow song and twittering calls was played at low volume (slightly louder than the normal song and twittering calls of Swallow), beside the mist net for periods ranging from two to 45 minutes (mean playing time, 16 minutes,  $n = 96$ ; occasions when the tape-lure malfunctioned or when no birds were present late in the season are excluded from this calculation). The tape-

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lure was usually started between sunset and 10 minutes after sunset. Twenty visits were made for the purpose of observing the behaviour of birds on evenings when a tape-lure was not played. Catching sessions (and observations) were carried out only in good weather conditions (calm to light breeze with no rain).

Loske (1984) described three phases of pre-roost activity in Swallows; (a) aimless flying by individuals, (b) tight flock formation and fast flying manoeuvres, and (c) instinctive descent behaviour. We found the first two of these phases were normally performed high in the air, while the third phase involved fast and low sweeps at < 1 m above the vegetation height. It was during the third phase activity that large numbers of birds entered the reedbed to roost, and it was at this moment that we measured the act of roosting both in terms of time after sunset and light intensity, ignoring early- or late-entering individuals. Times of sunset and the end of civil twilight (the time at which the centre of the sun is geometrically 6° below the horizon) for Ballyvergan Marsh were obtained from the world-wide-web ([www.aa.usno.navy.mil/data](http://www.aa.usno.navy.mil/data)) using Irish Summer Time (one hour ahead of GMT). In 2006 we used a digital illuminance meter (model TES 1330A) to record light intensity at the time of roosting. This was mounted 1.5 m above ground level on a tripod and positioned each time at a marked point within 20 m of the mist net.

### Statistical analysis

Data were analysed using one-way and two-way analyses of variance (ANOVA) in the statistical package MINITAB 14. In the text, means and standard errors (se) are given when appropriate; ns means not significant.

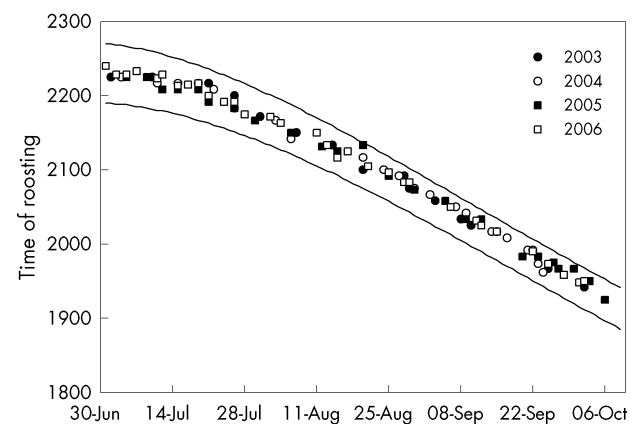
## RESULTS

There was no significant difference between the time after sunset that Swallows entered the roost when a tape-lure was played compared to when no tape-lure was played (2006 data only:  $t_{30} = 1.20$ ,  $P = 0.26$ , ns). Swallows roosted at a mean time of 22.80 minutes after sunset (se = 0.72,  $n = 25$ ) when a tape-lure was played and at a mean time of 24.43 minutes after sunset (se = 1.2,  $n = 7$ ) when no tape-lure was played. The time of roosting varied between 11 and 35 minutes after sunset (mean 22.2, median 22.0, se = 0.44,  $n = 94$ ). There was no significant difference in roosting time after sunset across years (one-way ANOVA:  $F_{3,90} = 0.94$ ,  $P = 0.42$ , ns; Fig 1). However, roosting time relative to sunset was marginally but significantly later in July than in August and September (one-way ANOVA:  $F_{2,86} = 2.93$ ,  $P = 0.059$ ), but the difference amounted to only just over two minutes in actual time. The mean time of roosting in minutes after sunset in each of the three

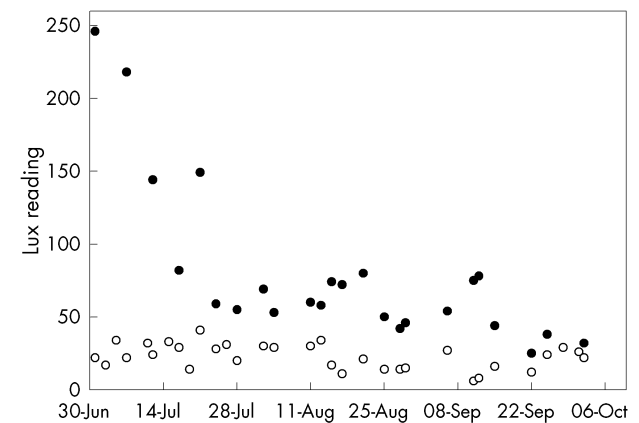
months was: July, 23.75 (se = 0.80,  $n = 32$ ); August, 21.52 (se = 0.87,  $n = 27$ ); September, 21.43 (se = 0.68,  $n = 30$ ). There was no significant interaction in the time of roosting between year and month (two-way ANOVA:  $F_{6,77} = 1.35$ ,  $P = 0.24$ , ns). The time interval between roosting of the earliest and latest birds usually spanned a period of about 10 to 15 minutes, but could be as long as 30 minutes when stragglers arrived late at the site. The light intensity at the time of roosting varied between 41 and 6 lux (mean 22.9, median 23.0, se = 1.52,  $n = 32$ ), although the earliest birds to roost did so at a light intensity of about 80 lux (Fig 2; 2006 data only).

## DISCUSSION

The use of a tape-lure at Ballyvergan Marsh did not appear to influence the time after sunset at which Swallows



**Figure 1.** Time of end of civil twilight (top line), time of sunset (bottom line) and time of roosting of Swallows at Ballyvergan Marsh, County Cork, 2003–06.



**Figure 2.** Light intensity (lux) at first capture (●) and at main roosting time (○) of Swallows at Ballyvergan Marsh, County Cork, 2006.

entered the roost. However, observations indicated that they roosted in different parts of the reedbed on evenings when no tape-lure was played compared to evenings when a tape-lure was played. This suggests that the tape-lure influenced their choice of roost location within the reedbed, a result already noted by Bub (1991) and other authors (references in Bub 1991).

Prevailing weather conditions may explain why roosting times varied between evenings (Fig 1). On 11 of 13 evenings when birds roosted early (*ie* 11 to 17 minutes after sunset) the sky was overcast or very overcast, while on each of eight evenings when birds roosted late (*i.e.* 29 to 35 minutes after sunset) it was calm with a clear sky. Therefore, overcast conditions which reduce light levels (and possibly insect availability) appear to induce birds to roost early, and calm weather with clear skies appears to induce birds to fly later.

Swallows roosted significantly later (relative to sunset) in July than in August and September. Pressure to obtain food could force birds to feed later, but this is unlikely in this case since the total amount of daylight available for feeding in July is greater than in August and September. It is more likely to be related to the longer period between sunset and the end of civil twilight in July compared with August and September (48 minutes on 1 July, reducing to 33 minutes on 30 September) (Fig 1). A contributory factor could be the lower proportion of overcast and breezy evenings recorded in July compared to August and September.

In Germany, Giller (1955) reported that Swallows roosted between about five and 25 minutes after sunset. He also stated that the roosting time can be influenced by rain and low temperatures, with birds coming to the roost about 10 minutes earlier on wet evenings. Loske (1984) reported that Swallows (also in Germany) settled (roosted) during a period up to 30 minutes after sunset, and that weather conditions had an influence on roosting behaviour.

Although the first birds entered the roost at Ballyvergan Marsh at a light intensity level of about 80 lux, the majority did not roost until the light level was between 41 and 6 lux. On some evenings in July a few birds were caught at higher light levels, but we feel these were unlikely to be entering the roost, and were more likely to be very young juveniles investigating the tape-lure well before their normal time of roosting. We did not observe behaviour that suggested genuine roosting attempts until the light intensity had dropped to about 80 lux (Fig 2). Indeed, apart from a few brief low-level investigative swoops, Swallows generally ignored the tape-lure until they were ready to enter the roost.

Our results show that it is possible to make successful catches of Swallows at an autumn communal roost by starting the tape-lure at sunset, and by playing it at low volume.

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## REFERENCES

- Bub, H.** (1991) *Bird Trapping and Bird Banding*. Cornell University Press, Ithaca.
- Cramp, S.** (ed) (1988) *The Birds of the Western Palearctic*. Vol. 5. Tyrant Flycatchers to Thrushes. Oxford University Press, Oxford.
- Curry-Lindahl, K.** (1963) Roosts of Swallows (*Hirundo rustica*) and House Martins (*Delichon urbica*) during the migration in tropical Africa. *Ostrich* **34**, 99–101.
- Ewins, P.J., Round, P.D. & Bazely, D.R.** (1991) Urban roosting by Barn Swallows *Hirundo rustica* wintering in Thailand. *Forktail* **6**, 68–70.
- Giller, F.** (1955) Beobachtungen an einem Rauchschwabenschlafplatz. *Vogelwelt* **76**, 180–184.
- Griffin, B. & Clark, J.** (2003) *Swallow Roost Project Newsletter*. No 1.
- Hutchinson, C.D.** (1989) *Birds in Ireland*. T. & A.D. Poyser, Calton.
- Loske, K.-H.** (1984) Beobachtungen an mittelwestfälischen Schlafplätzen der Rauchscharbe (*Hirundo rustica*). *Vogelwelt* **105**, 51–60.
- Mead, C.** (2002) Barn Swallow (Swallow) *Hirundo rustica*. In *The Migration Atlas: movements of the birds of Britain and Ireland* (eds Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. & Baillie, S.R.), pp. 462–464. T. & A.D. Poyser, London.
- Newton, S., Donaghy, A., Allen, D. & Gibbons, D.** (1999) Birds of conservation concern in Ireland. *Irish Birds* **6**, 333–344.
- Ormerod, S.J.** (1989) The influence of weather on the body mass of migrating Swallows *Hirundo rustica* in south Wales. *Ringing & Migration* **10**, 65–74.
- Rubolini, D., Pastor, A.G., Pilastro, A. & Spina, F.** (2002) Ecological barriers shaping fuel stores in Barn Swallows *Hirundo rustica* following the central and western Mediterranean flyways. *Journal of Avian Biology* **33**, 15–22.
- Rudebeck, G.** (1955) Some observations at a roost of European Swallows and other birds in the south-eastern Transvaal. *Ibis* **97**, 572–580.
- Turner, A.K.** (1994) *The Swallow*. Hamlyn, London.
- Turner, A.K.** (2004) Family Hirundinidae (swallows and martins). In *Handbook of the Birds of the World*. Vol. 9. Cotingas to Pipits and Wagtails (eds del Hoyo, J., Elliott, A. & Christie, D.A.), pp 602–685. Lynx Edicions, Barcelona.
- Turner, A.K.** (2006) *The Barn Swallow*. T. & A.D. Poyser, London.

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