

Biodiversity Record: First recorded nesting of the peregrine falcon, *Falco peregrinus ernesti*, in Singapore

Malcolm C. K. Soh^{1*}, Dustin Foo, Marc Kéry² & Max D. Y. Khoo¹

¹National Parks Board, Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569; Email: malcolm_soh@nparks.gov.sg (*corresponding author), max_khoo@nparks.gov.sg (Khoo)

²Swiss Ornithological Institute, 6204 Sempach, Switzerland; Email: marc.kery@vogelwarte.ch (Kéry)

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Subjects: Peregrine falcon, *Falco peregrinus ernesti* (Aves: Falconiformes: Falconidae).

Subjects identified by: Malcolm C. K. Soh, Dustin Foo, Marc Kéry and Max D. Y. Khoo.

Location and dates: Singapore Island, Central Business District; multiple dates between 2017 and 2024.

Habitat: Urban. Among concrete high-rise buildings.

Observers: Malcolm C. K. Soh, Dustin Foo, Marc Kéry and Max D. Y. Khoo.

Observations: On 9 December 2017, a female peregrine falcon was observed flying towards Millenia Tower in the Central Business District (CBD) by D. Foo. Additional ad-hoc observations in December 2017 and January 2018 showed additional behaviour displayed by the falcon, including hunting, territorial display/patrol flights (driving away other raptors, including the white-bellied sea eagle, Brahminy kite, changeable hawk-eagle and Oriental honey buzzard), and pairing up with a male peregrine falcon of a migratory subspecies. Further observations in the CBD resulted in the following records: In December 2018/January 2019 and December 2019/January 2020, a pair was observed engaging in what looked to be incubation changeovers. In December 2021/January 2022, an unpaired female was recorded. In December 2022/January 2023, a pair was observed and copulation was recorded on 29 December 2022 and 6 January 2023.

On the evening of 30 January 2024, M. Kéry saw what he thought might be a peregrine falcon flying around the SingTel building. Returning there on the evening of the 31 January 2024 and armed with binoculars and a telescope, he observed an adult pair copulating on the One George Street building. Later that night, the female (Fig. 1) entered a recess on the exterior of the OCBC Centre (Height: 197.7 m; 52 floors) and was not seen coming out again. Another observation session on the evening of 1 February 2024 by M. Kéry and M. C. K. Soh yielded essentially the same pattern: the pair was again observed copulating, this time on the top of the One George Street building, and later the female entered the very same recess on the exterior of the OCBC Centre where she had also disappeared the night before.

From 1 to 28 March 2024, remote cameras were placed on a balcony immediately below the recess for further observation. On 27 March 2024, a video with female-male interaction calls of the peregrine falcon pair in the background was recorded ([link](#)). On 23 April 2024, a telescopic tripod with a camera was raised to the recess to determine the breeding status (Fig. 2). A pair of eggs was observed on a bare concrete substrate (Fig. 3). No adult falcons were observed to be incubating the eggs or flying to the nest despite a single falcon observed on the opposite side of the building. On 7 May and 24 July 2024, the nest was checked again, and the eggs were still at the same location with no parent attending to them.

Remarks: The peregrine falcon is one of the most widespread bird species in the world (White et al., 2013, 2020). Many subspecies are widely known to nest on urban buildings, especially in North America, Europe, and Australia, but also in the other continents (White et al. 2013). The urban environment provides suitable nesting sites that are similar to their natural cliff-side habitats (Kettel et al., 2015; Mak et al., 2021). In addition, urban environments are often rich in the species of birds that peregrine falcons feed on most commonly, such as feral pigeons, starlings and gulls. These urban falcons have adapted to use ledges and alcoves of tall buildings, which offer safety from predators and proximity to prey (Kettel et al., 2015; White et al., 2020; Mak et al., 2021). However, in the majority of cases when peregrines nest on buildings, they do so in artificial nestboxes provided to them by humans (Sielitzki & Mizera, 2009).



Fig 1 [above]. Peregrine falcon (*Falco peregrinus ernesti*) on 28 March 2024. This individual was observed using the recess of the building (Photograph by: Malcolm C. K. Soh).

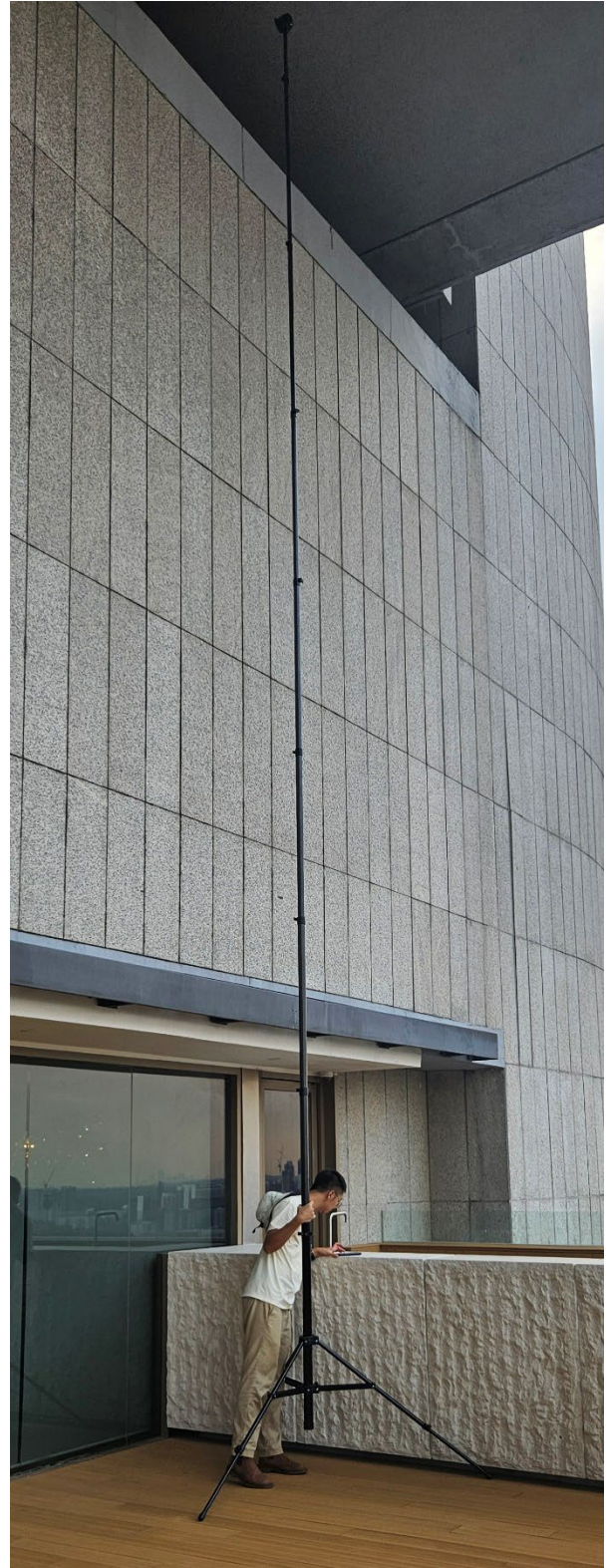


Fig. 2 [right]. Telescopic tripod setup with camera to inspect the nest in the recess (Photograph by: Malcolm C. K. Soh).

Three subspecies of the peregrine falcon occur in Singapore: migratory *Falco peregrinus japonensis* and *Falco peregrinus calidus*, and resident *Falco peregrinus ernesti* (Bird Society of Singapore, 2024). Extremely little is known about the biology of *Falco peregrinus ernesti*. The only published study of this subspecies is from Western Malaysia, where they have been reported to breed predominantly on tall limestone cliffs (>300 m high) (Molard, 2009; Ooi et al., 2020). However, a single breeding pair was also observed on a building in Kuala Lumpur, Malaysia (Ooi et al., 2020). Additional records of peregrine falcon pairs nesting on buildings have become known in Malaysia in more recent years (M. Kéry, personal observations).

In Singapore, *Falco peregrinus ernesti* is classified as a non-breeding resident (Bird Society of Singapore, 2024). While this subspecies has been recorded in several areas across the island (Pulau Ubin, Kranji Marshes, Sungei Buloh Wetland Reserve, Marina East Drive, Telok Blangah and the CBD), there had not been any record of a nest (Singapore Bird Group, 2024). In the CBD, this subspecies has been recorded as far back as 2008 (Lee Ee Ling, personal communication), and has also been recorded feeding on feral pigeons (*Columba livia*) in 2019 (Ong, 2019). This ties in neatly with observations made by D. Foo at the same place and the same time.



Fig. 3. Two peregrine falcon eggs on the concrete floor (yellow box) at the recess. See inset for enlarged version.(Photographs by: Malcolm C. K. Soh).

The nesting observation is the first record for *Falco peregrinus ernesti* in Singapore, albeit unfortunately unsuccessful. The multiple observations of peregrine falcons at the CBD and the OCBC building since 2008 suggest that this subspecies can adapt very well to life in urban environments in tropical latitudes. With only a single known breeding pair at present, the peregrine falcon may rightly be called Singapore's rarest breeding bird. However, the abandonment of eggs suggests that the current nesting substrate may not be ideal. Peregrine falcons typically nest on a loose gravel substrate where they can hollow out a scrape to hold the eggs (and sometimes also in abandoned nests of other species such as ravens or raptors). It seems clear that the absence of suitable substrate may impede nesting success at this location (White et al., 2020). Moving forward, providing a nest tray with loose gravel is expected to significantly improve nesting success.

Although the peregrine falcon is one of the most studied avian species in the world, hardly anything is known about its breeding in tropical latitudes (White et al., 2013; Ooi et al., 2020). In Peninsular Malaysia, they have laid eggs around late January and in early February (Molard, 2009; Ooi et al., 2020). Copulation is most frequent just before egg-laying (Ratcliffe, 1993). Our observations are consistent with an assumed egg laying period around these same dates. With an incubation period of about 31 days, it is likely that the eggs must have been added (embryos died) and abandoned by the time when we first saw them with the camera. After a failed nesting attempt, peregrine falcon pairs sometimes show again some elements of courtship, including encounters on the nesting ledge accompanied by calling (M. Kéry, personal observation). It is likely that it was this what was recorded on 27 March 2024.

With birds, there seems to be a strong biogeographical pattern that fewer eggs are laid in tropical regions than in higher latitudes (Jetz et al., 2008). This holds either for comparisons within the same species as well as for comparisons of closely related species. The normal clutch size of peregrine falcons in temperate latitudes is three to four (Ratcliffe, 1993). With Singapore located almost at the equator, it is thus interesting to note the small clutch size of only two for the pair featured here. While a sample size of one is not significant, this observation is at least suggestive in this direction.

While the peregrine falcon is extensively studied in temperate and cold latitudes, there remains a significant gap in our understanding of its breeding behaviour in tropical latitudes. Therefore, continued monitoring and research are essential to better understand the breeding ecology of this species in Singapore. Such efforts can inform conservation strategies to support the successful adaptation and breeding of this bird in Singapore's urban landscape.

Acknowledgement: The nesting location of the peregrine falcons is out of bounds to members of the public. We wish to thank OCBC for facilitating our access to the building.

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