

Increasing occurrence of House Swifts *Apus nipalensis* in Australia and an influx event to Darwin, Northern Territory

Peter M. Kyne¹, Christy-Louise Davies² and John Rawsthorne³

¹Research Institute for the Environment and Livelihoods, Charles Darwin University, NT 0909, Australia

²2/4 Giuseppe Court, Coconut Grove, NT 0810, Australia

³30 Jacksonia Circuit, Nightcliff, NT 0810, Australia

Email: peter.kyne@cdu.edu.au

Received: 4 March 2022

Accepted: 13 September 2022

The House Swift *Apus nipalensis* has an increasing range across Asia and is a vagrant to Australia. Within the Northern Territory, it was previously known from a single 1979 record which is also the first Australian record. An influx of birds to Darwin, Northern Territory, occurred in early 2019, with numerous sightings of up to 7 individuals between January and May. Most birds were in the company of Pacific Swifts *A. pacificus*, from which the House Swift can be distinguished by its noticeably smaller size, shorter and blunter wings, shorter body with a short, shallow-forked tail, and a lack of defined white scalloping on the underparts. Combining cases accepted by the Birdlife Australian Rarities Committee with records from the citizen science database eBird, there are now close to 40 confirmed records of the species in Australia, the bulk of which are from northern Australia, and records of House Swifts in Australia are increasing. The species has undergone a recent and likely ongoing range expansion, including to Indonesian islands close to northern Australia. This may eventually result in colonisation and establishment of breeding in Australia.

Keywords: House Swift; range expansion; vagrancy; Northern Territory; severe weather conditions

INTRODUCTION

Many bird species move outside their normal, documented geographic range (Lees and Gilroy 2022). Such vagrancy may result from navigational errors or from external environmental factors (Gilroy and Lees 2003; Lees and Gilroy 2022). One such factor is severe weather, including tropical cyclones or hurricanes, which often result in vagrant records after storm events (Lees and Gilroy 2022). Vagrancy can act as a form of dispersal (Gilroy and Lees 2003), and result in the establishment of new migration routes (e.g. Dufour *et al.* 2021) and range expansion (e.g. Crosby 1972).

Swifts (Apodidae) are a diverse family of aerial insectivores (del Hoyo *et al.* 1999; Chandler and Driessens 2000). The family has a cosmopolitan distribution, and comprises both resident and migratory species, some of which undertake annual trans-continental movements (del Hoyo *et al.* 1999; Chandler and Driessens 2000). The regular Australian swift fauna comprises a single resident swiftlet (Australian Swiftlet *Aerodramus terraereginae*) and two migratory, non-breeding swifts (Pacific Swift *Apus pacificus* and White-throated Needletail *Hirundapus caudacutus*) (Menkhorst *et al.* 2017). Additionally, a range of Asian swifts and swiftlets have been documented as vagrants, primarily to northern Australia and Australian Indian Ocean Territories, and their occurrence is often associated with tropical cyclones (Menkhorst *et al.* 2017).

The House Swift *Apus nipalensis* occurs across Asia from Nepal to Taiwan and Japan, throughout the Philippines, and in much of the Indonesian archipelago (del Hoyo *et al.* 1999; Chandler and Driessens 2000). It forms a superspecies with the Little Swift *A. affinis*, which occurs across Africa to India

and Sri Lanka, with which it has variously been regarded as conspecific or as a distinct species as is now recognised (del Hoyo *et al.* 1999; Chandler and Driessens 2000). The House Swift is undergoing an apparent range expansion through dispersal in the Wallacean biogeographic region of Indonesia, including to islands close to northern Australia (e.g. the eastern Lesser Sunda Islands, including Timor and Rote; Coates and Bishop 1997; Chandler and Driessens 2000; Ashari *et al.* 2018).

There are four recognised House Swift subspecies (see del Hoyo *et al.* 1999; Chandler and Driessens 2000). Where subspecific identification has been possible from collected specimens, Australian records have been identified as *A. n. subfurcatus*. However, most birds observed only in flight are probably not reliably identifiable to subspecies. The first Australian record, a bird found injured in 1979 at Point Stuart ~120 km ESE of Darwin in the Northern Territory (NT), was identified as *A. n. subfurcatus* (Robertson 1980), as was a deceased bird located at Cable Beach, Broome, Western Australia in 2018 (Johnstone and Greatwich 2018). This subspecies ranges from the Malay Peninsula, Sumatra, and the Riau Archipelago, to Borneo (del Hoyo *et al.* 1999; Chandler and Driessens 2000). It is thought that either *A. n. subfurcatus* or *A. n. furcatus* (Java and Bali, Indonesia) are the likely subspecies occurring in the more recently expanded parts of the House Swift's Indonesian range (i.e. Wallacea) (Coates and Bishop 1997; del Hoyo *et al.* 1999; Chandler and Driessens 2000).

The House Swift is most common in urban areas, where it nests in colonies on walls and roofs of structures including human dwellings, but it also nests in natural sites such as on cliffs and in caves (Chandler and Driessens 2000; Johnstone and Greatwich 2018). The closest known breeding population

Table 1

Summary of 2019 House Swift *Apus nipalensis* sightings in Darwin, NT. See Figure 1 for locations. Source: eBird (2022). nr = not reported. Sightings are grouped by date to produce ‘records’.

Record	Sighting	Location	Date	No. of individual House Swifts	No. of individual Pacific Swifts
1	1	The Gardens	27/01/19	1*	nr
2	2	Nightcliff	27/02/19	1	20
3	3	Casuarina Coastal Reserve	01/04/19	2	200
	4	Tiwi	01/04/19	2	110
	5	East Point	03/04/19	1	nr
4	6	Casuarina Coastal Reserve	04/04/19	2†	120
	7	Nightcliff	12/04/19	2	400
	8	Nightcliff	13/04/19	7	600
5	9	Nightcliff	29/04/19	6	14
6	10	Nightcliff	11/05/19	1	5
	11	Nightcliff	12/05/19	1	12
	12	Nightcliff	13/05/19	3	2

* Fatigued bird taken into care and subsequently released in Nightcliff a short time afterwards

† BARC Case No. 1159

to northern Australia is in Timor. Breeding was first documented there in 2003 and has been recorded in the months of December, March, and April (Johnstone and Greatwich 2018). Nest sites included coastal cliffs and underneath a statue in an urban area (Johnstone and Greatwich 2018). The adoption of human-made structures for breeding has been used to explain the species’ range expansion (Coates and Bishop 1997).

Until recently, the Point Stuart individual was the sole record from the NT. Here we report on an influx of House Swifts to Darwin over several months in 2019. We also compile and map all Australian records of the species and demonstrate an increasing trend in the species’ documented occurrence in Australia.

METHODS

Sightings of House Swifts were collated for (1) Darwin, NT during early 2019, and (2) Australia (mainland and offshore locations) across all years. The primary source for the 2019 Darwin sightings was our own observations, which were all reported to the online database eBird (eBird 2022). One of these sightings, of two birds seen at Casuarina Coastal Reserve on 4 April 2019, was appraised and accepted by the Birdlife Australian Rarities Committee (BARC; Case No. 1159; BARC 2022). Potential species with which the House Swift might be confused were systematically eliminated to validate the identification of the Darwin sightings.

We collated all Australian records of House Swifts from BARC (2022), eBird (2022), and Higgins (1999). Records accepted by BARC have been appraised and verified by the committee. Although eBird uses a less rigorous system of verification, sightings are nonetheless vetted and are herein treated as confirmed. In eBird, observers are alerted to the rarity status of the House Swift when they attempt to submit a checklist that includes this species from anywhere in Australia. Observers are prompted to enter comments on the sighting before the checklist can be submitted. Any sightings are then automatically listed in the eBird review queue and regional reviewers assess these records for accuracy, sometimes seeking additional

supporting information from the observer (e.g. photographs, additional field notes). If the sighting is verified by the reviewer, it is marked ‘accepted’ and appears on eBird (eBird 2022).

Some sightings that have been accepted by BARC also appear on eBird. Where a sighting is duplicated across these two sources, only the BARC case is included here. To avoid recording multiple sightings of the same birds, sightings were grouped where they occurred across consecutive or near-consecutive days (to a maximum of a four-day period). For example, 1–2 birds were seen at four locations in the northern suburbs of Darwin on 1 April 2019 (two sightings), 3 April 2019 (one sighting), and 4 April 2019 (one sighting). These were considered a single ‘record’ for analysis and mapping purposes. Therefore, a ‘record’ may comprise one or more ‘sightings’. The number of days on which House Swifts were reported was plotted as a function of the northern Australian monsoonal wet season (usually defined as November to April, but the month of May is included for the purposes of this paper to capture all records). Sightings were reviewed up to and including the 2020/21 wet season. Records were mapped using QGIS. A table of records is provided as supplementary materials.

RESULTS

Darwin 2019 records

Twelve House Swift sightings were made in Darwin in 2019 between 27 January and 13 May, with the grouping of sightings by date resulting in six records (Table 1). Most sightings were in the city’s northern suburbs, although this may reflect observer coverage (Fig. 1). The first sighting was of a bird found fatigued on a property in The Gardens (an inner-city suburb), which was taken into care on 27 January and subsequently released in the suburb of Nightcliff a short time later (Fig. 2). A single bird was observed over Nightcliff a month later (27 February). It is possible that this sighting was of the released bird, although there is no way to confirm this possibility. Between 1 April and 13 May there were 10 further sightings, each of 1–7 House Swifts (Table 1; Fig. 1).



Figure 1. Location of House Swift *Apus nipalensis* sightings in Darwin, NT, January to May 2019. Sighting details are provided in Table 1. Darwin International Airport (aeroplane symbol) is shown for reference. Inset: map of Australia with red circle showing location of Darwin. CCR=Casuarina Coastal Reserve.

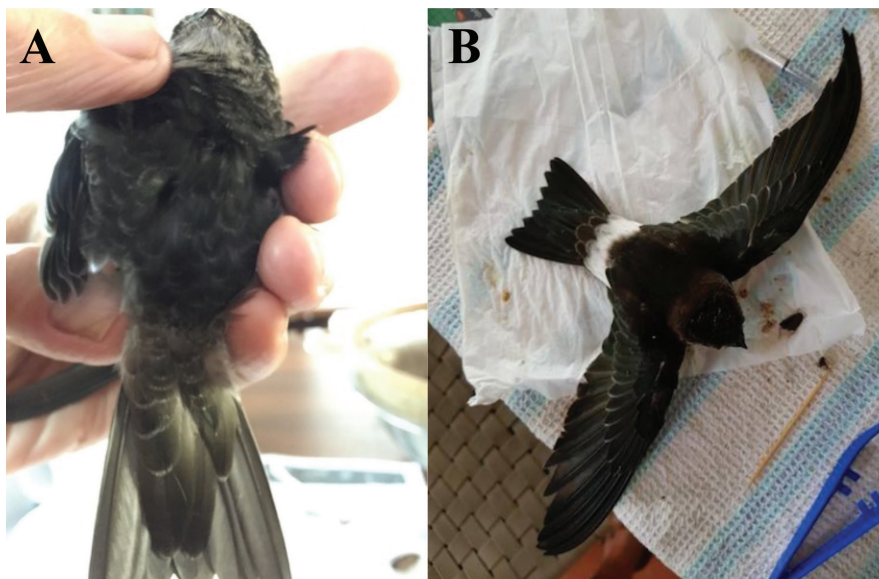


Figure 2. Underparts (2A) and upperparts (2B) of the House Swift *Apus nipalensis* found fatigued at a property in the Darwin suburb of The Gardens on 27 January 2019. The bird was rehabilitated and released in Nightcliff a short time afterwards. Note the appearance of a rounded outer tail and some dark streaking on the white rump, consistent with the subspecies *A. n. subfurcatus*.

Photos: Graham Kirby

The following features of the birds sighted were noted in field observations made by the authors: small, short-bodied swifts; wings short and blunt, broadest at the base; tail short with a shallow fork when closed; rounded outer tips to the tail when spread (outermost rectrices not longer than the others); plumage overall dark brown-black, except for pale throat and prominent white rump which extended onto rear flanks; bill greyish-black; eyes blackish (Fig. 3). No signs of primary, secondary, or tail moult were noted.

Examination of photos suggests that at least some of the Darwin birds were probably of the subspecies *A. n. subfurcatus*. The individual taken into care had a rounded outer tail and some dark streaking on the white rump (Fig. 2), which is consistent with *A. n. subfurcatus* and in contrast to *A. n. furcatus* which has an all-white rump (see Chandler and Driessens 2000). The bird photographed in Darwin on 4 April 2019 (Fig. 3) also had a rounded outer tail, which suggests that the two outermost rectrices are not longer than the other rectrices as would be the case in *A. n. furcatus* (see Chandler and Driessens 2000).

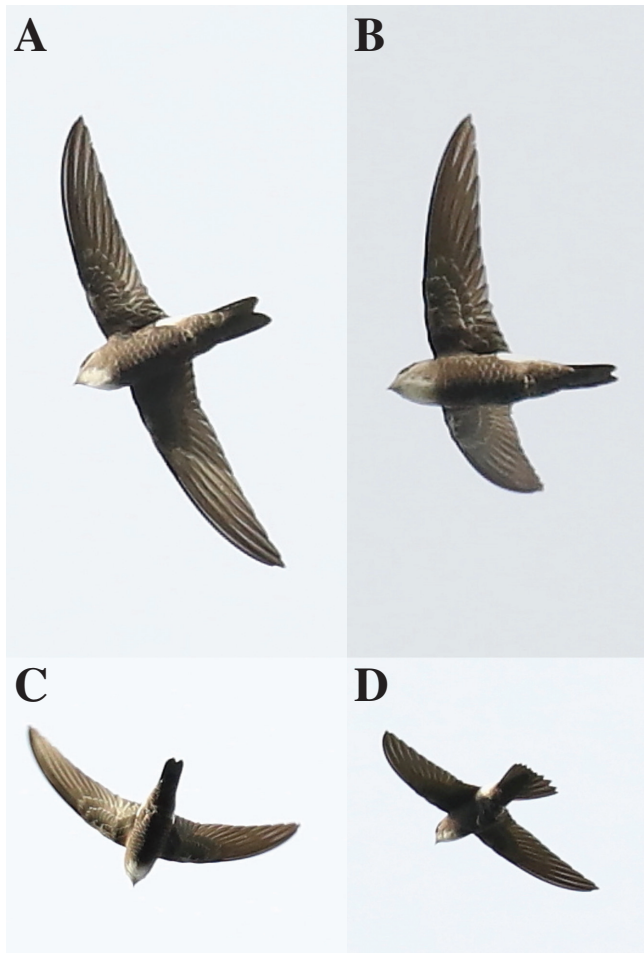


Figure 3. House Swift *Apus nipalensis* at Casuarina Coastal Reserve, Darwin, NT, 4 April 2019. These photos show the key features used to identify this species and distinguish it from Pacific Swifts *Apus pacificus*, which were present at the same site (see Figure 4) i.e. mostly dark plumage, white rump (extending onto the rear flanks), pale white throat, and short, shallow-forked tail (3A–D).

Photos: Peter M. Kyne

For all sightings in which other associated species were recorded (10 of 12 sightings), House Swifts were in the company of Pacific Swifts, with the numbers of that species ranging from 2–600 birds (Table 1). House Swifts were distinguished from Pacific Swifts (including the possibility of Pacific Swifts in tail moult) by their smaller size, shorter body, shorter and blunter wings (lacking the long, narrow, sickle-shaped wings of Pacific Swifts), short and shallow-forked tails, and the lack of defined white scalloping on the underparts (Fig. 4). The flight pattern was noticeably more erratic than the long glides of accompanying Pacific Swifts.

Other swift species can be eliminated as the subjects of these observations as follows:

The White-throated Needletail is rarely observed in the NT (eBird 2022), but is easily distinguished from the House Swift by its characteristic plumage pattern (large white throat patch and white undertail-coverts which extend along the flanks), and short, square tail. These features also eliminate potential vagrant

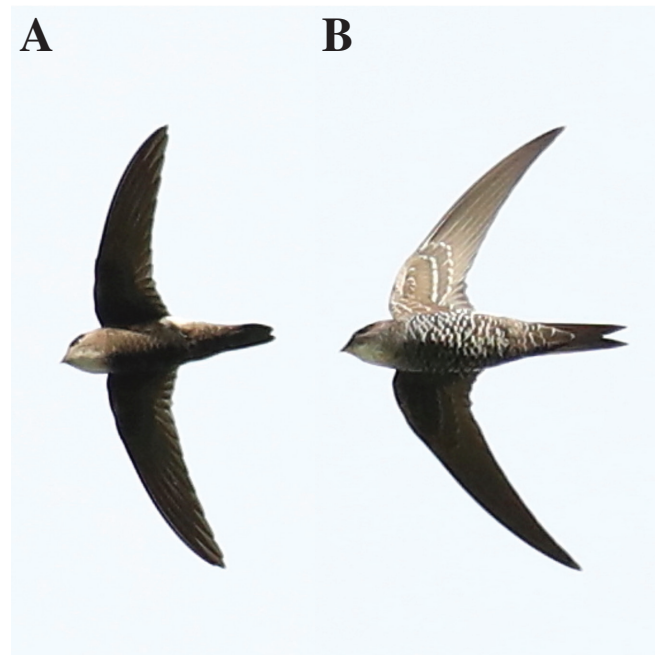


Figure 4. Comparison of (4A) House Swift *Apus nipalensis* and (4B) Pacific Swift *Apus pacificus* at Casuarina Coastal Reserve, Darwin, NT, 4 April 2019. The observed House Swifts were smaller than Pacific Swifts, were shorter-winged, lacking the long, sickle-shaped wings of Pacific Swifts, and shorter-bodied with short, shallow-forked tails compared to the long, deeply-forked tail of the Pacific Swift (see also Figure 3). Note the defined white scalloping of the underparts of the Pacific Swift which is lacking in House Swifts.

Photos: Peter M. Kyne

needletail species. Swiftlets are smaller and lighter in colour than the House Swift, and the size and dark plumage with a prominent white rump and pale throat of House Swifts eliminates all swiftlets as candidates, including the Australian Swiftlet and possible vagrant *Collocalia* and *Aerodramus* species, several of which have been observed, or have the potential to occur, in northern Australia (Menkhorst *et al.* 2017). Lastly, in addition to the House Swift and the Pacific Swift, three other *Apus* species have white rumps. However, none of these species have been recorded in Australia and they are distinguished from House Swifts by tail shape i.e. a short, square tail in the Little Swift (ranges from Africa to India and Sri Lanka); longer, more prominently forked tail in the Horus Swift *A. horus* (Africa), and a longer, deeply-forked tail in White-rumped Swift *A. caffer* (Africa and southern Europe) (del Hoyo *et al.* 1999; Chandler and Driessens 2000).

Australian records

The Birdlife Australian Rarities Committee has accepted 16 cases of House Swifts occurring in Australia (Supplementary Table 1). These comprise records from Western Australia (7), Indian Ocean Territories (2 from Christmas Island; 1 from Cocos (Keeling) Islands), Queensland (3), NT (2), and Ashmore and Cartier Islands (1) (Fig. 5). Apart from a single record from Caboolture in southeast Queensland, all mainland Australian records have been from northern Australia (i.e. north of the Tropic of Capricorn). The committee has not accepted nine additional submissions of House Swift observations from New South Wales (5), Queensland (3), and South Australia (1).

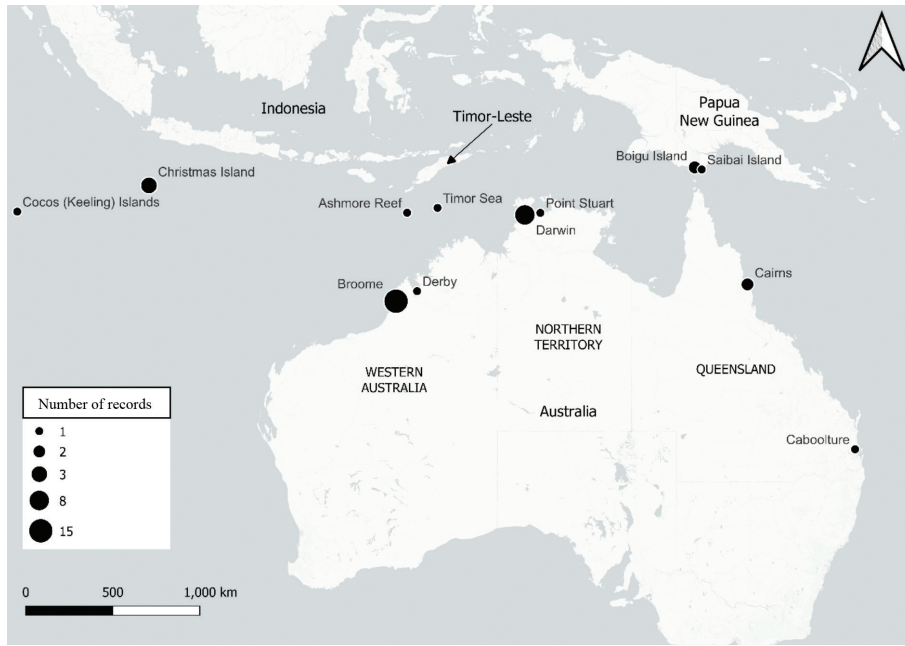


Figure 5. Location of all confirmed Australian House Swift *Apus nipalensis* records (black circles). Map shows Birdlife Australia Rarities Committee accepted cases (BARC 2022) and eBird accepted records (eBird 2022).

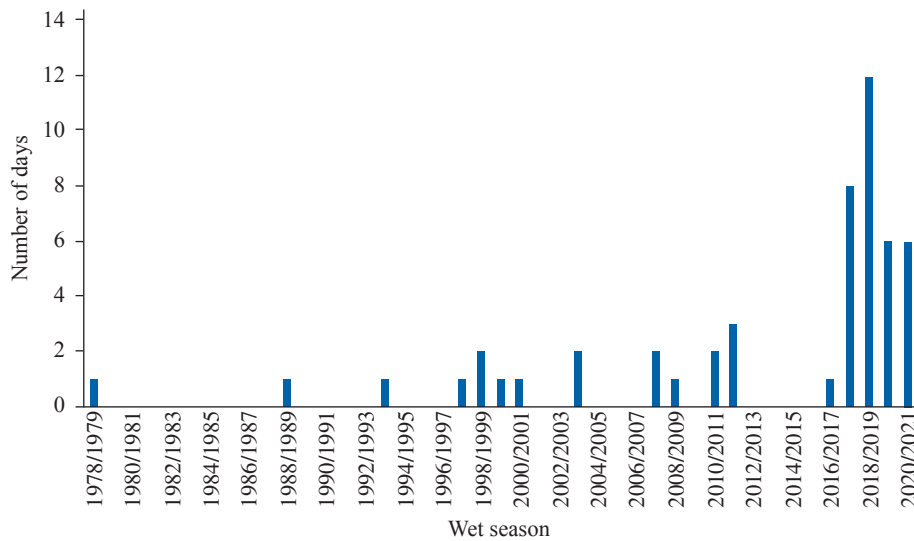


Figure 6. Australian House Swift *Apus nipalensis* records as a function of the number of days on which they were reported in each wet season from 1978/1979 to 2020/2021. Birdlife Australia Rarities Committee accepted cases (BARC 2022) and eBird accepted records (eBird 2022) are plotted. For analytical purposes, the wet season is November to May.

Higgins (1999) reported another four unconfirmed records from Queensland (2), New South Wales (1), and South Australia (1). Of these 13 unconfirmed records, all but three were from south of the Tropic of Capricorn.

An additional 21 records have been reported on eBird (a ‘record’ may comprise sightings made across consecutive or near-consecutive days – see Methods; Supplementary Table 1). These are from Western Australia (9), NT (7), Queensland (3), Indian Ocean Territories (1 Christmas Island), and the Timor Sea (1) (Fig. 5). All are north of the Tropic of Capricorn. Combining

BARC-accepted cases and eBird records, there has been a total of 37 House Swift records in Australia.

Since the first record in the 1978/79 wet season, House Swifts have been reported in 17 of the last 43 northern Australian wet seasons. The frequency of reporting and number of days on which House Swifts are reported are increasing (Fig. 6). In the decade 1978/79–1987/88 House Swifts were reported in one wet season, in 1988/89–1997/98 in three, in 1998/99–2007/08 in five, in 2008/09–2017/18 in five, and in each of the three wet seasons from 2018/19 to 2020/21.

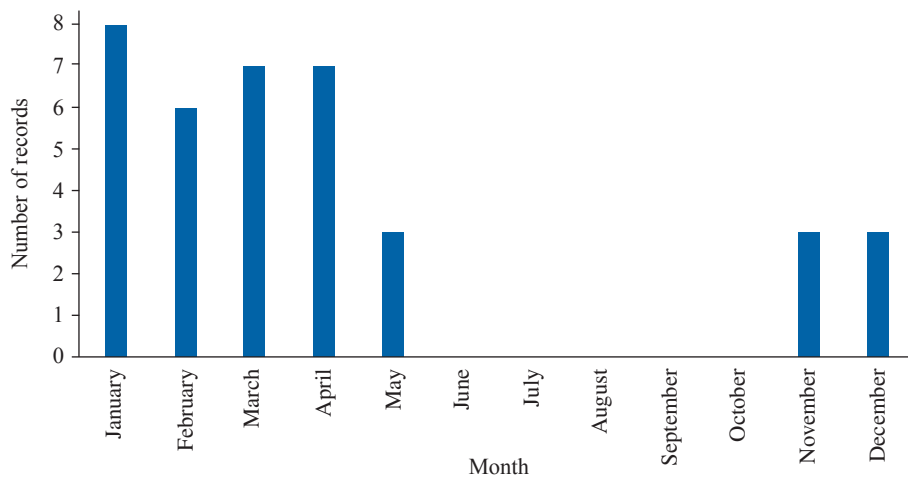


Figure 7. Australian House Swift *Apus nipalensis* records by month. *Birdlife Australia Rarities Committee accepted cases (BARC 2022) and eBird accepted records (eBird 2022) are plotted.*

Records occur from November to May, with a peak from January to April (Fig. 7). The earliest date is from the very beginning of the northern Australian wet season (5 November 2003, Ashmore Reef; BARC 2022) and the latest is from the early dry season (31 May 2020; Derby, Western Australia; eBird 2022).

Of 34 records in which the number of birds sighted was specified, 19 were of a single bird, four were of two birds, and the remainder from three to 40+ birds (BARC 2022; eBird 2022). There have been no reports of actual or suspected breeding in Australia.

DISCUSSION

Vagrancy can potentially lead to the colonisation and establishment of a breeding population in previously unoccupied suitable habitat (Gilroy and Lees 2003; Donahue and Lee 2008). The House Swift has a wide and expanding Asian range and is a regular vagrant to northern Australia. It is evident that the frequency of reporting of this species in Australia has been increasing recently. However, the compilation of records presented here does not account for observer effort and effectiveness (e.g. the increased availability of high-quality optics and cameras) which may contribute to more records being made. It also does not account for changing climate and its influence on both tropical weather patterns (Chan and Kepert 2010) and vagrancy in birds (e.g. Jiguet and Barbet-Massin 2012). This may be most relevant to House Swift records in northern Australia, as all sightings have been during, or close to, the monsoonal wet season (Fig. 7) and many sightings are linked to monsoonal low-pressure systems or cyclones (Menkhorst *et al.* 2017; Johnstone and Greatwich 2018). Exploring the relationship between sightings and weather, with adjustment for observer effort, would provide a better understanding of House Swift occurrence patterns. Nonetheless, the increasing frequency of sightings, the documented dispersal, range expansion, and colonisation by the species through parts of southeast Asia, including the Lesser Sunda islands close to Australia (Coates and Bishop 1997; Chandler and Driessens 2000; Ashari *et al.* 2018), and the availability of nest sites (e.g. human structures; Chandler and Driessens 2000) suggest that future colonisation of Australia is possible.

Although the species was previously unrecorded in Darwin, there was an influx of House Swifts over the city during early 2019. Multiple sightings of up to seven individuals were reported over 4.5 months. Prior to this there was only a single NT record from Point Stuart in 1979, which also constituted the first Australian record (Robertson 1980). Most House Swifts sighted were in the company of the Pacific Swift, an abundant migrant to northern Australia in its non-breeding season (Higgins 1999). After the initial report of a fatigued House Swift which was rehabilitated and released, local birdwatchers became more diligent in searching flocks of Pacific Swifts for associated House Swifts. The subsequent sighting of a free-flying bird a month later resulted in further observer effort (pers. obs.), which can produce further records (*sensu* Laney *et al.* 2021). It is unknown if early 2019 was an anomaly or if House Swifts regularly occur with Pacific Swifts in the NT and have been overlooked. Two sightings in the following year suggest that its occurrence is not as irregular as previously documented (i.e. there was a 40-year gap between the first and subsequent NT records). A local birdwatching community which is now aware of House Swifts will likely continue to produce additional records by careful examination of Pacific Swift flocks.

Many Australian House Swift records occur after severe weather, particularly tropical cyclones (Menkhorst *et al.* 2017). The first 2019 Darwin sighting (27 January) was soon after the passing of Severe Tropical Cyclone (STC) *Riley* across northwest Australia (BOM 2022). This system developed as a tropical low to the north of Darwin before moving in a southwest direction, strengthening into a tropical cyclone north of Broome, and then moving westwards (BOM 2022). This cyclone was accompanied by a House Swift record in Broome around the same time (25 January; BARC Case No. 1052; BARC 2022). There were no further tropical lows or cyclones off northwest Australia until STC *Wallace* which formed north of Darwin on 3 April, strengthening into a tropical cyclone on 6 April north of Kalumburu, Western Australia, and then moving westwards (BOM 2022). Darwin sightings of House Swifts in April (1–4th and 12–13th) may have been associated with this system. However, the remaining Darwin sightings in 2019 cannot be directly attributed to tropical low-pressure systems

or cyclones, so it is unclear if the movement of these birds to Australia was influenced by STC Riley or Wallace or if their occurrence was independent of severe weather.

The House Swift has gradually been expanding its range through Wallacea. This dispersal has been documented through the following reports of first records and/or breeding: southern Sulawesi in 1978 (breeding); Flores in 1986 (breeding by 1990); northern Sulawesi in 1987 (breeding); Ambon in 1991; Salayar off southwest Sulawesi in 1993; Timor in 1993 (several breeding sites identified between 2003 and 2006); Yamdena (Tanimbar Islands) in 1997; Wetar in 2008/2009; Seram in 2009 (nest-building); and Rote in 2015 (White and Bruce 1986; Coates and Bishop 1997; Chandler and Driessens 2000; Trainor *et al.* 2009; Lansley *et al.* 2011; Ashari *et al.* 2018; Johnstone and Greatwich 2018). Observer coverage throughout Wallacea is limited and the species may have spread more widely through the Lesser Sunda Islands. The subspecies occurring in Wallacea has not been verified (del Hoyo *et al.* 1999; Chandler and Driessens 2000), but it has been suggested that it is *A. n. subfurcatus*, a claim partially supported by the Australian records (Johnstone and Greatwich 2018).

With the House Swift's recent expansion across, and colonisation of Wallacea, breeding populations are now geographically closer to northern Australia than was previously the case. The increasing frequency of sightings in Australia is therefore not unexpected. Breeding expansion through Wallacea can probably be attributed at least in part to the adoption of human structures for nesting (Coates and Bishop 1997). Despite northern Australia being sparsely populated by humans, suitable House Swift nesting sites (e.g. human structures, Chandler and Driessens 2000) exist in urban areas, including larger centres such as Darwin and Broome. These two locations are responsible for a significant number of the Australian records of House Swifts as both support established birdwatching communities, although records are spread widely across northern Australia. It is not unreasonable to suspect that over time colonisation and the establishment of a breeding population may occur in Australia. Johnstone and Greatwich (2018) suggested this possibility for the Kimberley region of Western Australia, and that notion is supported by the ongoing range expansion and the increasing frequency of sightings in Australia described here.

ACKNOWLEDGEMENTS

We thank BARC for appraising the submission for 2019 Darwin birds and all observers for submitting sightings to BARC or eBird. We also thank Graham Kirby for rehabilitating the original Darwin bird and providing permission to use photographs, and Marc Gardner for assistance with literature searches. We thank the reviewers, Colin Trainor and Richard Noske, for helpful comments on the manuscript.

REFERENCES

- Ashari, H., Prawiradilaga, D. M., Eaton, J. A., Suparno and Rheindt, F. E. (2018). New records and range extensions of birds from Timor, Alor and Rote. *Treubia* **45**: 47–64.
- Birdlife Australia Rarities Committee (BARC) (2022). *Birdlife Australia Rarities Committee Index of Cases*. Available: <https://birdlife.org.au/conservation/science/rarities-committee> (Accessed: 02 January 2022).
- Bureau of Meteorology (BOM) (2022). *Tropical cyclone reports*. Available: <http://www.bom.gov.au/cyclone/tropical-cyclone-knowledge-centre/history/past-tropical-cyclones/> (Accessed: 02 February 2022).
- Coates, B. J. and Bishop, K. D. (1997). *A Guide to the Birds of Wallacea*. Dove Publications, Alderley.
- Chan, J. C. L. and Kepert, J. D. (eds.) (2010). Global perspectives on tropical cyclones. From science to mitigation. *World Scientific Series on Asia-Pacific Weather and Climate: Volume 4*. World Scientific, Singapore.
- Chandler, P. and Driessens, G. (2000). *Swifts. A Guide to the Swifts and Treeswifts of the World*. Second Edition. Yale University Press, New Haven.
- Crosby, G. T. (1972). Spread of the Cattle Egret in the western hemisphere. *Bird Banding* **42**: 205–212.
- del Hoyo, J., Elliot, A. and Sargatal, J. (eds.) (1999). *Handbook of the Birds of the World. Volume 5. Barn-owls to Hummingbirds*. Lynx Edicions, Barcelona.
- Donahue, M. J. and Lee, C. T. (2008). Colonization. In: *Encyclopedia of Ecology* (Second Edition) **3**: 42–47.
- Dufour, P., de Franceschi, C., Doniol-Valcroze, P., Jiguet, F., Guéguen, M., Renaud, J., Lavergne, S. and Crochet, P.-A. (2021). A new westward migration route in an Asian passerine bird. *Current Biology* **31**: 5590–5596.
- eBird (2022). *eBird: An online database of bird distribution and abundance* [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: <http://www.ebird.org>. (Accessed: 02 January 2022).
- Gilroy, J. J. and Lees, A. C. (2003). Vagrancy theories: are autumn migrants really reverse migrants? *British Birds* **96**: 427–438.
- Higgins, P. J. (ed.) (1999). *Handbook and Australian, New Zealand and Antarctic Birds. Volume 4. Parrots to Dollarbird*. Oxford University Press, South Melbourne.
- Jiguet, F. and Barbet-Massin, M. (2012). Climate change and rates of vagrancy of Siberian bird species to Europe. *Ibis* **155**: 194–198.
- Johnstone, R. E. and Greatwich, B. (2018). First Western Australian specimen of House Swift (*Apus nipalensis*) with notes on its distribution and migration. *West Australian Naturalist* **31**: 105–112.
- Laney, J. A., Hallman, T. A., Curtis, J. R. and Robinson, W. D. (2021). The influence of rare birds on observer effort and subsequent rarity discovery in the American birdwatching community. *PeerJ* **9**: e10713.
- Lansley, P. S., Lester, C. and Dashper, S. (2011). Bird observations in the south Moluccas, Indonesia, in 2009 with new migration, breeding and altitudinal records. *Birding Asia* **15**: 68–70.
- Lees, A. and Gilroy, J. (2022). *Vagrancy in Birds*. Bloomsbury Publishing, London.
- Menkhorst, P., Rogers, D., Clarke, R., Davies, J., Marsack, P. and Franklin, K. (2017). *The Australian Bird Guide*. CSIRO Publishing, Clayton South.
- Robertson, D. G. (1980). First record of the House Swift *Apus affinis* (Apodidae) in Australia. *Australian Bird Watcher* **8**: 239–242.
- Trainor, C. R., Imanuddin, Aldy, F., Verbelen, P. and Walker, J. S. (2009). The birds of Wetar, Banda Sea: one of Indonesia's forgotten islands. *Birding Asia* **12**: 78–93.
- White, C. M. N. and Bruce, M. D. (1986). *The Birds of Wallacea*. British Ornithologists' Union, London.

Supplementary Table 1

Compilation of all Australian House Swift *Apus nipalensis* records in chronological order. Sources: Birdlife Australia Rarities Committee (BARC 2022) and eBird (2022). A record may comprise sightings made across consecutive or near-consecutive dates (i.e. 'No. of days observed' may not equal the full date range if birds were not observed on each day in the date range). Jurisdictions: ACI, Ashmore and Cartier Islands; EEZ, Exclusive Economic Zone; IOT, Indian Ocean Territories; NT, Northern Territory; QLD, Queensland; WA, Western Australia. nr = not reported.

Source	BARC Case No.	Location	Jurisdiction	Wet season	Date(s)	No. of days observed	No. of Individuals
BARC	91	Point Stuart	NT	1978/1979	16/03/1979	1	1
eBird		Timor Sea	EEZ	1988/1989	30/11/1988	1	2
BARC	177	Caboolture	QLD	1993/1994	1/01/1994	1	1
BARC	235	Broome	WA	1997/1998	02/1998	1	nr
BARC	274	Kuranda	QLD	1998/1999	19/12/1998	1	1
BARC	275	Cairns	QLD	1998/1999	27/12/1998	1	1
BARC	302	Broome	WA	1999/2000	6/03/2000	1	1
BARC	496	Broome	WA	2000/2001	15/02/2001	1	1
BARC	415	Ashmore Reef	ACI	2003/2004	5/11/2003	1	1
eBird		Broome	WA	2003/2004	25/03/2004	1	1
BARC	570	Christmas Is.	IOT	2007/2008	27–28/04/2008	2	7
eBird		Saibai Is.	QLD	2008/2009	22/02/2009	1	nr
eBird		Christmas Is.	IOT	2010/2011	5/01/2011	1	nr
BARC	686	Broome	WA	2010/2011	6/04/2011	1	1
BARC	737	Christmas Is.	IOT	2011/2012	28/11–01/12/2011	2	1
eBird		Broome	WA	2011/2012	11/01/2012	1	1
BARC	1139	Cocos (Keeling) Is.	IOT	2016/2017	19/03/2017	1	1
BARC	1032	Broome	WA	2017/2018	11–13/01/2018	3	1–40+
BARC	1034	Broome	WA	2017/2018	16–18/02/2018	3	1–4
eBird		Broome	WA	2017/2018	19–20/03/2018	2	1–6
BARC	1052	Broome	WA	2018/2019	25/01/2019	1	1
eBird		Darwin	NT	2018/2019	27/01/2019	1	1
eBird		Darwin	NT	2018/2019	27/02/2019	1	2
BARC	1159	Darwin	NT	2018/2019	1–4/04/2019	3	1–7
eBird		Darwin	NT	2018/2019	12–13/04/2019	2	2–7
eBird		Darwin	NT	2018/2019	29/04/2019	1	6
eBird		Darwin	NT	2018/2019	11–13/05/2019	3	1–3
eBird		Broome	WA	2019/2020	8/01/2020	1	1
eBird		Broome	WA	2019/2020	29/02/2020	1	1
eBird		Boigu Is.	QLD	2019/2020	4/03/2020	1	1–3
eBird		Boigu Is.	QLD	2019/2020	9/03/2020	1	1
eBird		Broome	WA	2019/2020	26/05/2020	1	2
eBird		Derby	WA	2019/2020	31/05/2020	1	1
eBird		Broome	WA	2020/2021	9–11/12/2020	2	1–3
eBird		Broome	WA	2020/2021	21–22/01/2021	2	1–26
eBird		Darwin	NT	2020/2021	13/04/2021	1	1
eBird		Darwin	NT	2020/2021	19/04/2021	1	2