

Fairy Martin – is it declining in the Hunter?

Mike Newman¹ and Ann Lindsey²

¹72 Axiom Way, Acton Park, Tasmania 7170, Australia omgnewman@bigpond.com

²37 Long Crescent, Shortland, NSW 2307, Australia ann.lindsey@bigpond.com

Anecdotal, qualitative and quantitative information all point to a possible decline of the Fairy Martin *Petrochelidon ariel* in the Hunter Region. This decline involved abandoned breeding colonies as well as a decline in frequency and range of occurrence between 1998 and 2008, with only partial subsequent recovery. The species is now primarily found breeding colonially near large expanses of open water. Possible causes of decline within the Hunter Region included the adverse impact of dry conditions on insect prey populations, increased predation at some nest sites and changes in habitat quality.

INTRODUCTION

The appearance of a new species either nationally, regionally, or just in backyards, is greeted with excitement by birdwatchers. In contrast, common species in decline often go unnoticed. Other than for regularly monitored species, like shore- and water-birds, initial realisation that a species may be “in trouble” is often subjective, unquantified and reliant on anecdotal evidence. In the Hunter Region Fairy Martin *Petrochelidon ariel* is an example; the authors realised during monthly surveys at the Morpeth Wastewater Treatment Works (MWTW) that they were seeing it less often and in much smaller numbers than formerly. In addition it had deserted several historical breeding colonies. Fortunately, some quantitative evidence was available to test our perceptions as discussed in this note.

The Fairy Martin is widely distributed in eastern Australia, but is vagrant to Tasmania. Birds are found in all seasons, but occurrence is less frequent in winter in south-eastern Australia, indicating a partial migration north after the breeding season (Barrett *et al.* 2003). In the Hunter Region the Fairy Martin’s status is that of a breeding summer migrant regularly recorded as flocks of up to 20 birds from early August to mid-March with small numbers of birds remaining over winter (Stuart 1994 - 2013).

METHODS

Hunter Region records of the Fairy Martin were extracted from BirdLife Australia’s Birdata archive involving records submitted by bird watchers carrying

out Atlas and bird monitoring surveys. The following analysis is based on all records submitted to Birdata at May 2014. Annual Reporting Rates of Fairy Martins were calculated using all surveys in 10-minute grids for which a Fairy Martin had been recorded at least once between 1998 and 2014. Records were also obtained from the Hunter Bird Observers Club (HBOC) Annual Bird Report Series (Stuart 1994 - 2013). Incidental and anecdotal information was sought by direct approaches to people known to regularly frequent key Fairy Martin habitat.

RESULTS

BirdLife Australia’s Atlas project archive Birdata contains a comprehensive inventory of Fairy Martin records in the Hunter Region for the period 1998 - 2013. During that period there were 786 Fairy Martin survey records, 711 from area surveys, and 75 from 2ha-20 minute surveys, and 15 incidental records.

Distribution

Fairy Martin Birdata records were widely distributed from across the Hunter Region, with records from 48% of the 151 ten-minute grids which comprise the area. The distribution of the records is shown in **Figure 1** which indicates a considerably decreased range for the period 2010 - 2013 compared with 1998 - 2009. The contraction of range mostly occurred in the north of the Region and in coastal areas north of Newcastle. For the period 2010 - 2013 Fairy Martins were recorded in 2013 in a disproportionate number of grids, particularly in the north, suggesting a partial recovery in Hunter Region range in that year.

The apparent decline in range should be treated with caution because the behaviour of observers contributing to the Atlas and bird monitoring projects changed (e.g. different survey site locations and number of surveys) over the 16-year period of data collection. For instance between 1998 and 2002, during the active phase of the New

Atlas (Barrett *et al.* 2003), there was a high level of survey effort aimed at mapping bird distributions throughout the Region. With the subsequent focus on monitoring changes in the status of bird populations, there has been an increased emphasis on repeat surveys at the same site and less broad coverage of the region.

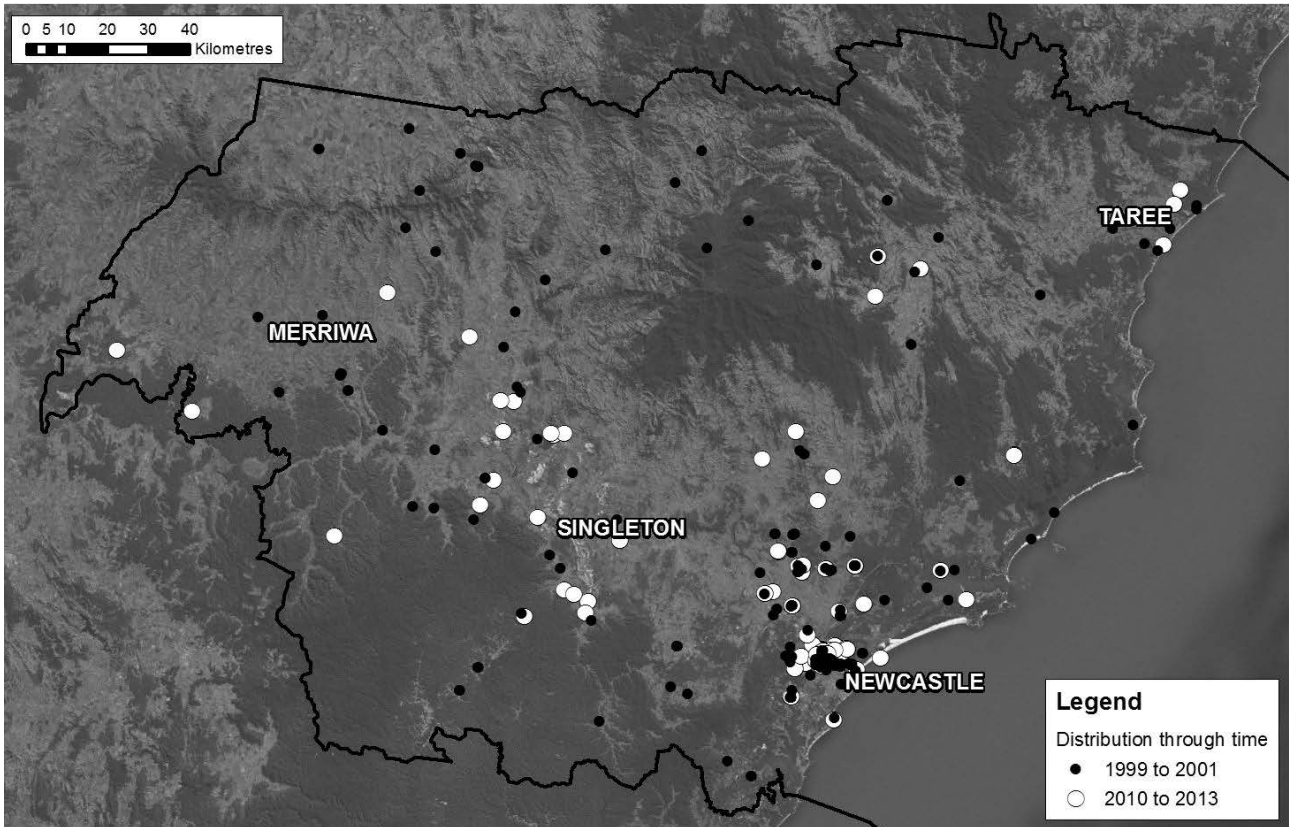


Figure 1. Distribution of Fairy Martins in Hunter Region of NSW based on all survey and incidental records submitted to BirdLife Australia’s Birdata archive for the period 1998 – 2013 showing a contraction in range during the study.

Reporting Rates Trends

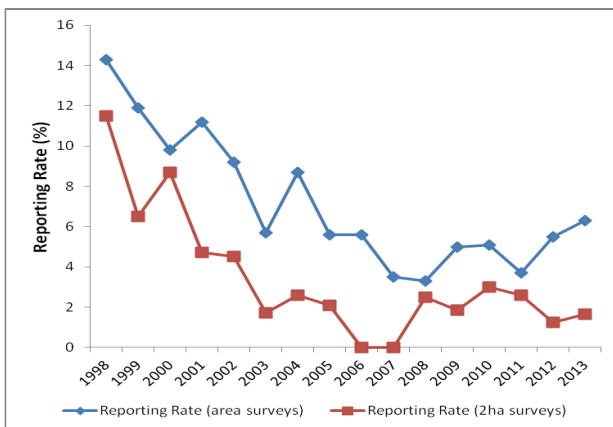


Figure 2. Variation in Reporting Rate of Fairy Martins in the Hunter Region (1998 - 2013) based on records submitted to the BirdLife Australia Birdata (n=711 for area surveys; n=75 for 2ha-20 minute surveys).

The trends in annual reporting rates (the frequency martins were recorded) are shown in **Figure 2**. For both survey types trends were similar, with an extended period of decline during the first ten years, followed by a modest recovery during the last five years of the period. Calculation of annual reporting rates corrects for variations in survey effort, but not for variations in the spread of survey sites. We place greater reliance on the area survey data because it involves more Fairy Martin records (n=711), gathered from a wider area of the Hunter Region than the 2ha-20-minute surveys (n=75) (44% as opposed to 17% of the 151 grids comprising the Hunter Region). The higher reporting rate for the area surveys reflects the increased survey effort (i.e. areas surveyed are typically larger than 2ha and survey duration longer than 20 minutes). The mean annual

reporting rate for area surveys for the period 2010 - 2013 was 50% lower than for the 1998 - 2009 period while the mean annual reporting rate for 2ha-20-minute surveys was 59% lower than the 1998 - 2009 period. The correspondence between the trends for the two types of survey adds confidence to the validity of the decline. However, as the comparisons do not involve replicated surveys (e.g. comparisons involving the same survey sites in identical seasons during the two periods) we looked for supporting evidence. Our monthly surveys at the MWTW between 2001 and 2013, where we estimated the number of martins present (**Figure 3**), provided evidence supporting the **Figure 2** trends. In the first two years of that study (2001 and 2002) large numbers of Fairy Martins were seen, often lining the wires of fence lines in association with Tree Martins *Petrochelidon nigricans* and Welcome Swallows *Hirundo neoxena*. These flocks mostly occurred in late summer and autumn, involving northward migration at the end of the breeding season. During the subsequent 11 years similar numbers were seen only in 2010, supporting our subjective conclusion that the species had become less common at MWTW and other areas like Pambalong Nature Reserve where we used to see similar accumulations of the species.

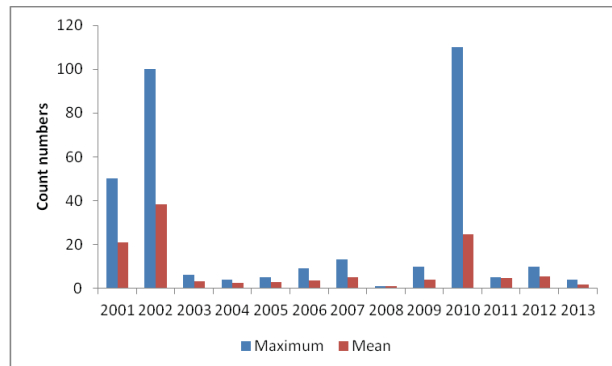


Figure 3. Variations in the maximum and mean numbers of Fairy Martins recorded during monthly counts at the Morpeth Wastewater Treatment Works near Maitland, NSW.

Breeding

It is more difficult to ascertain the extent to which breeding has declined. However, the following instances provide a basis for concern. Fairy Martins breed communally, attaching their clusters of bottle-shaped nests to an overhanging surface, often using the concrete culverts under roads and the eaves of buildings as sites. Perhaps the example best known to Hunter Bird Observers Club members is the colony which nested at the

Hunter Wetlands Centre (HWC) under the eaves of the building used to hold club meetings. This colony was deserted in 2001, when the nests were destroyed during building maintenance. Nest destruction does not necessarily cause desertion of a breeding location as evidenced by the Singleton experience described below.

Fairy Martins attempted to breed on the east side of Hexham Swamp each year between 2008/09 and 2012/13. Typically the peak numbers of martins present ranged from 50 to 150, with between 12 and 90 nests recorded annually. Interest in old nests commenced as early as August with peak breeding activity in October 2011 when a total of 90 nests were spread across four locations. However, following heavy rain all breeding activity had ceased by late November. In other years nesting activity continued into January. The two most frequently used nest sites were a railway signal box and under the eaves of an unoccupied house on the edge of the swamp.

During the 1990s there were two breeding colonies, approximately 1km apart, in the Woodville-Butterwick area near Paterson, both in culverts under Butterwick Road and Glenurie Close. For two years the latter colony deserted the culvert and nested under the eaves of an adjacent house. It was suspected that predation by feral cats may have driven the shift from nesting in the culvert to the eaves. Subsequently, both colonies were deserted and Fairy Martins have been scarce in the area with no evidence of breeding during the last decade. The precise date the colonies were deserted was not recorded. No colonies are currently known in the broader Paterson area, including the Tocal Homestead (Cameron Archer pers. comm.), where the combination of extensive ponds and old buildings might be expected to provide ideal breeding opportunities.

Grant Brosie's "big year" focus on the Maitland Local Government Area (LGA) in 2013 involved sampling bird habitat throughout the area in order to obtain a comprehensive inventory of the local bird population. He found only one active colony at Oakhampton and one apparently abandoned Fairy Martin colony at Dagworth Road, Louth Park. In addition about 15-20 birds were flying into a culvert at Brush Road, Raworth; unfortunately the culvert was on private land and could not be inspected. Clearly the extent to which Fairy Martins currently breed in the Maitland LGA is limited.

In the Singleton area two colonies were visited on 4 February 2014. At the colony in John Street comprising 75 – 80 nests, around 25 martins were present, including activity at two nests. This colony, on an old brick building, has been used persistently in recent years, despite the nests being removed on at least two occasions. It is approximately 400m from the nearest permanent water, the Hunter River. The other colony at the Singleton Wastewater Treatment Works (WTW) involved approximately 50 nests, many in good condition. Despite many martins being present at the site and nearby locations, no activity at the nests was observed. However, these observations relate to the end of the season and no conclusions can be drawn about the extent of breeding activity and success at either site earlier in the 2013/14 season.

In 2002 substantial numbers of Fairy Martins were nesting under the culvert on the East Bucketts Way at Gloucester, where it crosses the Avon River and its drainage channels. In October 2004 floods washed out the nests and the martins deserted the colony. In 2013/14 searches for breeding colonies were unsuccessful, although a small number of Fairy Martins was recorded entering the culvert where Avon Valley Road crosses Oakey Creek, but there was no evidence of breeding.

Incidental Records and Anecdotal Information

We also examined the Fairy Martin species accounts in the Hunter Bird Observers Club Annual Bird Report series for the period 1993 – 2012. There was a general decrease in the number and size of Fairy Martin flocks reported, with the exception of regularly watched areas with sizable expanses of open water like Hexham Swamp, Ash Island, Morpeth and Singleton WTW. Similarly, there was a decrease in the number of locations for which breeding was recorded. These qualitative indications are consistent with the trends shown in **Figures 1** and **2**.

Long-term resident Peter Alexander's subjective opinion is that the Fairy Martin has become less numerous in the Singleton area over the past decade, despite the continued occupancy of colonies.

DISCUSSION

The primary purpose of this short note is to highlight the possibility that the Fairy Martin has declined in the Hunter Region. The evidence presented above comprises five categories:

1. Abandonment of a number of breeding colonies.
2. Decreased occurrence of large flocks at Morpeth WTW between 2003 and 2013 (**Figure 3**).
3. A decline in the reporting of Fairy Martins during bird surveys between 2000 and 2006, followed by a partial recovery between 2009 and 2013 (**Figure 2**).
4. Decreased range of occurrence in the Hunter Region (**Figure 1**).
5. Anecdotal evidence based on opinions of experienced bird watchers.

The five categories, listed above in order of decreasing strength of evidence, all suggest that the status of the Fairy Martin has declined in the Hunter Region. While it may be argued that the trends shown in **Figures 1** to **3** may all be influenced by sampling factors, it is an indisputable fact that a number of breeding colonies have been abandoned. The strength of the evidence for reporting rate trends and Morpeth WTW numbers is considered relatively strong, although possibly exaggerated by changes in observer behaviour in the former case. For instance, reporting rates are corrected for variations in number of surveys conducted annually, but not for variations in the locations and habitat surveyed. At Morpeth WTW there is the risk that monthly surveys missed the peak build-up of martins on migration in some years, but it is unlikely this occurred in 10 years out of 11. Of greater concern is the possibility that the spread of survey effort across the Hunter Region decreased after 1998 - 2002 when the New Atlas project finished, biasing the observed change in distribution (**Figure 1**) and conclusions on the extent of decreased range should be treated with caution.

Causes of decline may involve ecological factors both within and external to the Hunter Region. However, we suggest the selective abandonment of breeding colonies in the Hunter is probably associated with local environmental conditions, although the possibility of extensive mortality during winter months, when most martins have

departed to areas north of the Hunter, cannot be discounted. The decline in the size of flocks at the end of the season may involve birds moving north from areas to the south of the Hunter Region.

It is difficult and beyond the scope of this paper to attribute specific causes to the proposed decline. Within the Hunter Region candidate factors include the influence of climatic conditions on food availability, changes in the habitat of areas supporting martins and predation at breeding colonies.

Fairy Martins are insectivorous aerial feeders for which hot dry conditions may limit food availability (Mike Tarburton pers. comm.). In this respect it may be significant that the declining Reporting Rate (RR) values (**Figure 2**) coincided with the period 2000 - 2006 during which climatic conditions persistently involved below long-term mean rainfall in the Paterson area (central Hunter Valley) with 2003 and 2006 exceedingly dry years in much of the Hunter Region. The partial recovery in RR values did not occur until 2009 after wetter conditions returned in 2007. For the Grey Fantail *Rhipidura fuliginosa*, another insectivorous species, similar trends in Hunter Region observation rates correlated with annual rainfall lagged by two years (Newman 2012). This suggests the size of bird populations follows the decline and build-up of the abundance of prey and explains the delayed recovery of martin populations until 2009. We tentatively suggest the impact of dry conditions will be most marked away from large areas of permanent water leading to the abandonment of colonies in drier areas; particularly culverts over dry creeks in open country.

Many nest sites used by Fairy Martins have anthropogenic origins, indeed artificial structures including the eaves of buildings, bridges and culverts under roads are more commonly reported than natural sites like cliff overhangs and caves (see breeding section above). It is possible that changes in the design and maintenance of man-made structures have decreased the availability of elevated nest sites like the eaves of buildings, forcing the use of sites near ground level like culverts, where the risk of predation is higher. Ongoing increases in rural development will have exacerbated the situation in terms of increased densities of predators, such as feral cats, possibly leading to the widespread demise of colonies nesting close to the ground in culverts.

Wastewater treatment works like Morpeth have been upgraded to tertiary treatment during the past

two decades. This may have decreased nutrient levels in holding ponds and outflows into ephemeral wetlands, with a potential negative impact on insect populations.

Colonial breeding species like Fairy Martin tend to be less uniformly distributed across the landscape than species which breed as isolated pairs. Hence decline involving the loss of a breeding colony may cause a local extinction as opposed to a decrease in abundance of a species. On this basis the range of colonial breeding species might be a very sensitive indicator of the regional status of a species and the trends shown in **Figures 1** and **2** may be valid. If so, this poses the intriguing question as to what factors trigger recolonisation or the formation of new colonies. As food availability and breeding success at existing colonies improves, does the population increase to a level where there is excess capacity causing sub-groups to split off and seek new breeding opportunities, possibly at sub-optimal locations which are only suitable for limited periods of time?

CONCLUSIONS

In this paper we have presented anecdotal, qualitative and quantitative evidence pointing to a possible decline of Fairy Martin in the Hunter Region. Changes in the status of bird populations are dynamic and the trend hopefully will be reversed. Indeed, there was some evidence of recovery between 2009 and 2013, particularly in 2013. The question is how do we measure future change? The publication of this paper may increase observer awareness of Fairy Martins resulting in an increased number of incidental reports and compounding the difficulty of drawing conclusions about changes in status from the “highlight” information recorded in the Hunter Region Annual Bird Report series, where the material submitted is highly selective (e.g. only observations involving >20 birds recorded). We suggest the best approach is for a small number of regional observers to provide an annual inventory of breeding colonies within areas immediately surrounding their homes, as occurred in Grant Brosie’s study of the Maitland LGA during 2013. This will allow testing of one of our tentative explanations of the cause of decline, namely that under drier conditions the distribution of colonies contracts to areas near large expanses of permanent water, hopefully expanding back and recolonising drier locations when favourable conditions return. The fact that Fairy Martins nest colonially is highly

advantageous to monitoring in that the flocks of birds around breeding colonies are obvious and breeding activity is limited to a few locations. There is also the question of whether the size of pre-migratory flocks has changed. Just posing this question illustrates how little we know about this phenomenon; how stable are these flocks and for how long do they congregate in areas like Morpeth WTW? Again this is an opportunity for further bird study.

Tarburton (2014) has described evidence for a marked decline in the status of the White-throated Needletail *Hirundapus caudacutus* in Australia. This species is a non-breeding migrant to Australia. The most probable single cause of decline was considered to be the destruction of the Siberian forests, where a large portion of the Australian population of needletails needs old trees with hollows in which to breed. Tarburton considers there is an urgent need for further research into the population and conservation status of this species. The findings of this paper may highlight the need for similar broad-scale analysis of the status of the Fairy Martin in Australia, assuming trends in the Hunter are widespread.

ACKNOWLEDGEMENTS

The authors thank numerous members of the Hunter Bird Observers Club for providing their records and recollections of Fairy Martins in the Hunter Region, particularly Peter Alexander (Singleton), Grant Brosie (Maitland) and Penny Drake-Brockman (Gloucester) who made specific searches for active breeding colonies

in their local areas. Mike Tarburton is thanked for insights into his specialty; the behaviour of insectivorous birds of the sky. Alan Stuart and Harold Tarrant are thanked for comments on the interpretation of the decline. As always in articles of this type access to the wealth of knowledge contained in BirdLife Australia's Birddata archive is invaluable; we thank Andrew Silcocks, Alan Stuart, Ian Martin, Peter Struik and Dan Williams for their contributions to presenting the data in a manner which allows critical analysis and publication.

REFERENCES

- Barrett, G., Silcocks, A., Donnelly, C., Cunningham, R., and Poulter, R. (2003). 'The New Atlas of Australian Birds'. (Royal Australasian Ornithologists Union: Melbourne.)
- Newman, M. (2012). Fluctuations in numbers of Grey Fantails in the Hunter Region of New South Wales. *Australian Field Ornithology* **29**: 57–76.
- Stuart, A. (Ed.) (1994 – 2013). Hunter Region of New South Wales Annual Bird Report Series Numbers **1** to **20** (1993 – 2012). (Hunter Bird Observers Club Inc.: New Lambton, NSW.)
- Tarburton, M.K. (2014). Status of the White-throated Needletail *Hirundapus caudacutus* in Australia: Evidence for a marked decline. *Australian Field Ornithology* **31**: 122-140.