Raptors at Woodville – insights into the difficulties of assessing raptor populations

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Whole-of-month lists of birds recorded from my home at Woodville in the Hunter Valley provided a valuable inventory of the raptor population of that location between 2000 and 2013. The results were consistent with those conducted contemporaneously at the nearby Morpeth Wastewater Treatment Works using a more rigorous survey protocol. Differences in the results reflect the attraction of some raptor species to wetlands (Morpeth) and the close proximity of the Woodville site to woodland. Collecting monthly inventories of raptor records in this manner at an array of locations has the potential to provide improved insights into their regional status.

INTRODUCTION

The birding community has a peculiar fascination with raptors. As apex predators the status of raptors informs ecologists about the state of the environment. For birders, a raptor sighting inevitably creates excitement, the reasons for which are multi-faceted, invoking the adjectives majestic, spectacular and rare.

As a guild, raptors are well represented in the Hunter Region, but tracking their status is challenging. Generally, they have large territories, are scarce and infrequently recorded in short duration surveys such as BirdLife Australia's preferred Birdata 2ha 20-minute surveys. Appreciating this difficulty, raptor experts realised the need for a survey protocol uniquely targeting Birds of Prey (BOP) and the BOP Watch project was initiated in the 1980s (Baker-Gabb & Steele 1999).

BOP Watch involved recording the occurrence of birds of prey while driving cars; essentially it involved monitoring an extended transect over an extended period of time. Cooper *et al.* (2014) also appreciated the advantage of sampling large areas over extended periods of time, perpetuating the use of the protocols of the First Australian Atlas (Blakers *et al.* 1984) in NSW. This involved recording birds in 10-minute latitude/longitude grids. Newman & Lindsey (2016) tracked the trajectories of raptor species at the Morpeth Wastewater Treatment Works (WWTW) monthly between 2001 and 2015 using Birdata 500m surveys.

In Tasmania, I have successfully established statistically significant trends for the Grey Goshawk and other raptor species using the 25-year data sets of Ralph Cooper and Richard Ashby (Newman *in prep*.). Both sampled 5km areas in a consistent manner at approximately monthly intervals. Cooper's approach was to spend approximately 50 hours a month visiting a number of locations within approximately 5km of his home in peri-urban Launceston. In contrast, Ashby's surveys were made over a period of around 4 hours on one day, using a fixed route through bushland in NW Tasmania.

Reflecting on the success of these analyses for Tasmania, I realised that I had a number of potentially suitable Hunter data sets each involving more than a decade of monthly monitoring. However, although most of those data sets sampled areas of 50ha or greater of woodland, they involved same-day surveys that only had restricted views of the sky (the primary domain of most raptors). Hence, I chose to evaluate a data set based upon whole-of-month observations from my home, where I had unrestricted views of the sky.

METHODS

The observations were made from my property at Woodville in the Hunter Region of NSW (32.667ºS, 151.614ºE). The property was approximately 2ha in size, located in lightly timbered country on the edge of the Butterwick flood plain. Nearby woodland at Green Wattle Creek provided connectivity to well-forested ridges in the Duns Creek area.

Birds were recorded opportunistically throughout the month and submitted as Birdata 500m surveys, although observations almost exclusively occurred from within the 2ha area of the property. The survey duration was nominally recorded as four hours, but a bird-orientated family is always peripherally aware of the presence of unusual species. Over a 14-year period 142 surveys were completed (average 10.1 surveys/annum; range 5-12 surveys/annum). The number of surveys in different months varied from 7 to 14 with an average of 11.8 surveys/month. Results were expressed as Reporting Rates (RR) to correct for differences in the numbers of surveys in different years in temporal and seasonal analyses, respectively. Reporting rate is the number of records for a species divided by the number of surveys, expressed as a percentage.

I had been living at Woodville for seven years when these surveys commenced and was familiar with the raptors of the area, an important factor with respect to the reliability of the survey data, given the challenges associated with raptor identification.

RESULTS

Sixteen species of diurnal and one nocturnal raptor species were recorded at Woodville over a 14-year period commencing January 2000 (**Table 1**). The nocturnal Southern Boobook was the most regularly recorded species (RR 36.6%). Whistling Kite was the most frequently recorded diurnal raptor (RR 20.4%) and nine of the diurnal species had RRs of <5%, with four being recorded on a single occasion.

Table 1. Occurrence and reporting rates of raptor species at Woodville between 2000 and 2013 based on 142 monthly Birdata 500m surveys.

Species common name	Scientific name	Number of records	Reporting Rate (%)
Black-shouldered Kite	*Elanus axillaris*	11	7.7
Square-tailed Kite	*Lophoictinia isura*	1	0.7
Pacific Baza	*Aviceda subcristata*	1	0.7
Wedge-tailed Eagle	*Aquila audax*	20	14.1
Swamp Harrier	*Circus approximans*	8	5.6
Spotted Harrier	*Circus assimilis*	1	0.7
Grey Goshawk	*Accipiter novaehollandiae*	4	2.8
Brown Goshawk	*Accipiter fasciatus*	7	4.9
Collared Sparrowhawk	*Accipiter cirrocephalus*	2	1.4
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	11	7.7
Whistling Kite	*Haliastur sphenurus*	29	20.4
Southern Boobook	*Ninox boobook*	52	36.6
Nankeen Kestrel	*Falco cenchroides*	20	14.1
Australian Hobby	*Falco longipennis*	24	16.9
Brown Falcon	*Falco berigora*	5	3.5
Black Falcon	*Falco subniger*	1	0.7
Peregrine Falcon	*Falco peregrinus*	3	2.1

Temporal trends

With exception of the Southern Boobook and Whistling Kite (**Figure 1**) there were insufficient records to establish meaningful temporal trends. The annual RRs of Southern Boobook and Whistling Kite both decreased, at rates of 25%/decade and 53%/decade respectively. The average annual RR of the other 14 raptor species decreased by 40%/decade (**Figure 2**).

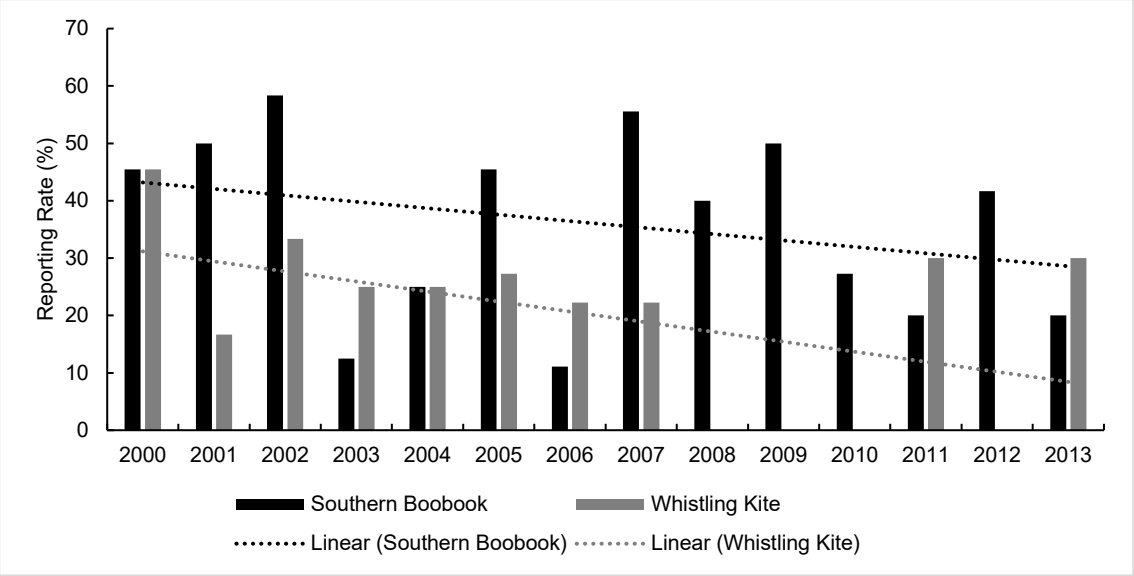

Figure 1. Variation in the Annual Reporting Rates of the Southern Boobook and Whistling Kite for monthly Birdata 500m surveys at Woodville between 2000 and 2013.

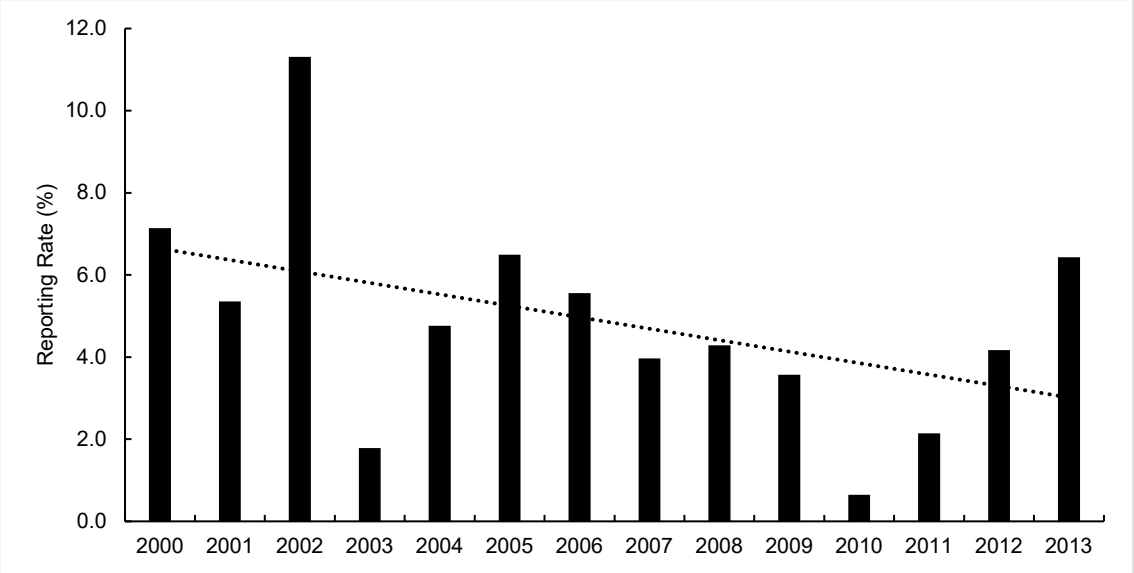

Figure 2. Variation in the mean Annual Reporting Rate of 14 raptor species for monthly Birdata 500m surveys at Woodville between 2000 and 2013.

Seasonal variations

There were sufficient records to establish meaningful seasonal trends in occurrence for six species. The Southern Boobook was recorded throughout the year, but primarily between September and April (**Figure 3**).

The patterns of occurrence of the Whistling Kite and Wedge-tailed Eagle were remarkably similar, with most records of both species occurring between January and June (**Figure 4**). In contrast, the Black-shouldered Kite and Nankeen Kestrel were mostly recorded between June and November (**Figure 5**). There was no clear seasonal pattern in the occurrence of the Australian Hobby (**Figure 6**).

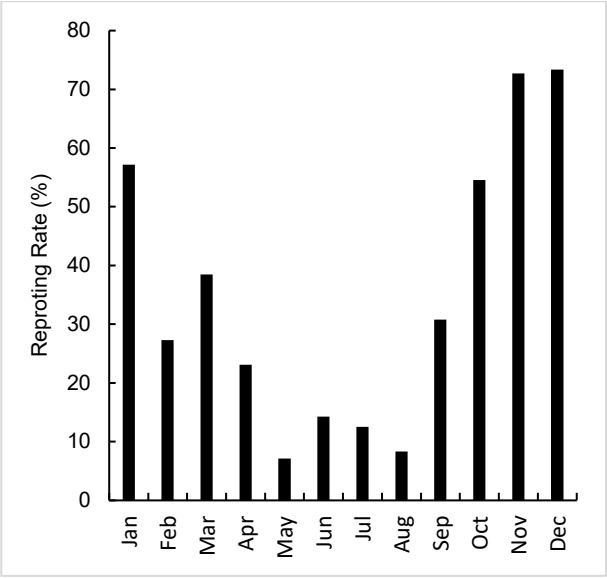

Figure 3. Seasonal variation in the Reporting Rate of the Southern Boobook for monthly Birdata 500m surveys at Woodville between 2000 and 2013.

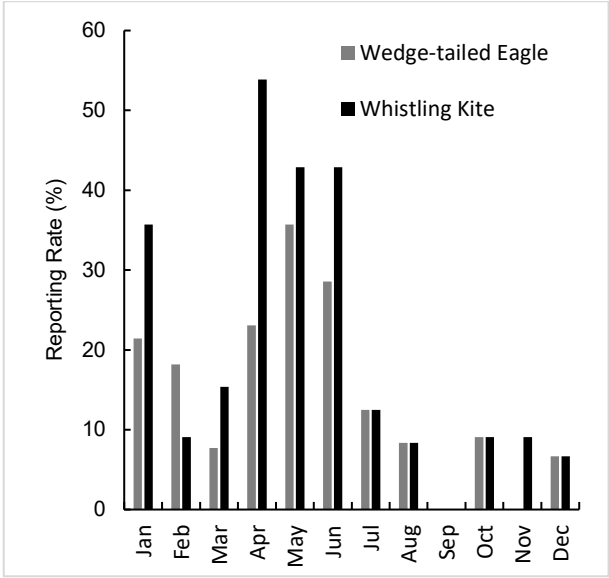

Figure 4. Seasonal variation in the Reporting Rate of the Wedge-tailed Eagle and Whistling Kite for monthly Birdata 500m surveys at Woodville between 2000 and 2013.

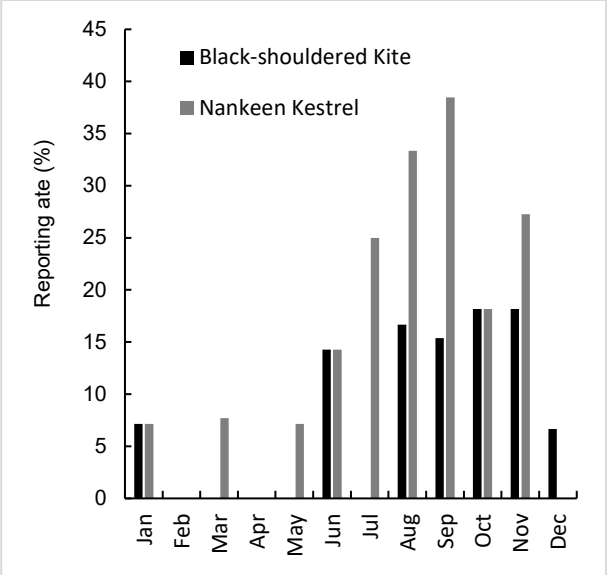

Figure 5. Seasonal variation in the Reporting Rate of the Black-shouldered Kite and Nankeen Kestrel for monthly Birdata 500m surveys at Woodville between 2000 and 2013.

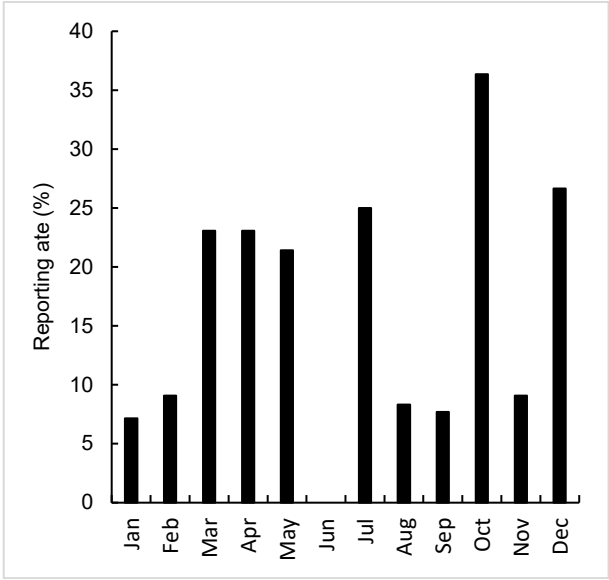

Figure 6. Seasonal variation in the Reporting Rate of the Australian Hobby for monthly Birdata 500m surveys at Woodville between 2000 and 2013.

DISCUSSION

Comparison with other studies

The 16 diurnal species seen between 2000 and 2014 represent a high proportion of the 20 raptor species regularly recorded in the Hunter Region. A 17th species, Black Kite *Milvus migrans* was observed within 1 km of my property.

The relative magnitudes of the RRs in **Table 1** are generally consistent with the status of raptor species in the Hunter Region. For instance, Birdata surveys conducted monthly at the Morpeth WWTW, located approximately 10km from Woodville (Newman & Lindsey 2016), provide an excellent basis for comparison (**Figure 7**). Sixteen diurnal raptor species were recorded in both studies, of which 15 were common to both locations. It is not surprising that a number of species were recorded more frequently at Morpeth WWTW because wetlands provide important foraging opportunities for raptors and some, like the White-bellied Sea-Eagle, were breeding at the site.

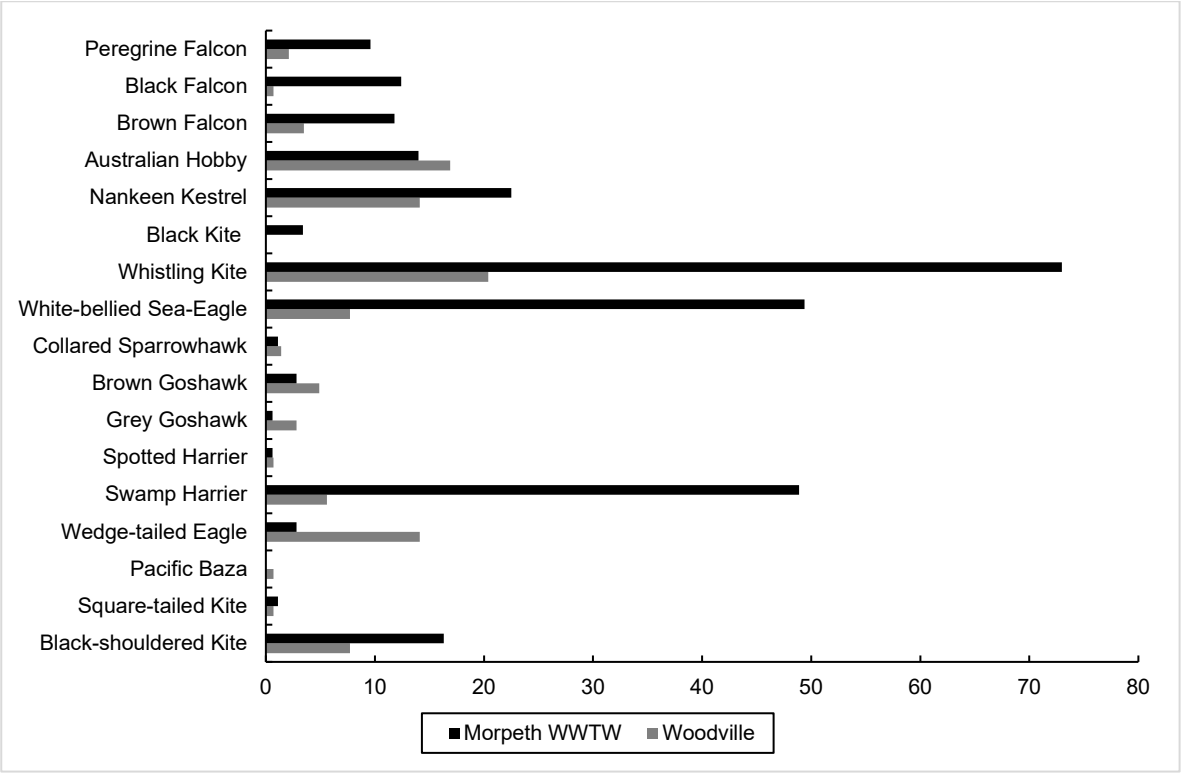

Figure 7. Comparison of the occurrence of diurnal raptors at Morpeth WWTW (176 surveys between 2001 and 2015) and at Woodville (142 surveys between 2000 and 2013).

Temporal trends

The decreases in RR observed in this study are consistent with those identified at the regional scale by Cooper *et al.* (2014) for the period 1986 to 2006. The Morpeth study identified similar decreasing trends that were statistically stronger because there were more raptor records than at Woodville. However, a more recent analysis provides tentative evidence of more stable populations (Williams 2019).

Seasonal occurrence

The period of peak occurrence of the Southern Boobook corresponds to its breeding season (Cooper *et al.* 2016). Most records of this species relate to calling birds. The extent to which the dearth of records between May and August relates to decreased vocalisation, as opposed to movement from the area, is unclear (Cooper *et al.* 2014).

Raptors primarily breed in late winter and spring. Hence, the predominance of Whistling Kite and Wedge-tailed Eagle records in late summer and autumn may indicate the post-breeding dispersal of birds into the area and the absence of nearby nest sites. Conversely, the increased occurrence of Nankeen Kestrel and Black-shouldered Kite in spring may indicate that they were breeding nearby at that time and that they subsequently dispersed.

Because of the absence of any clear pattern of seasonal variation, the Australian Hobby appeared to be an uncommon resident.

The role of whole month surveys

The results presented in this paper suggest that this type of survey has a niche as part of the portfolio of survey protocols. It lacks the rigour of repeat surveys conducted in a consistent manner, such as those made at Morpeth WWTW. In addition, these survey lists don't record how frequently common species are recorded and hence may over-state the occurrence of less common species. However, regularly recorded species usually involve the same birds. An alternative approach is to record opportunistic sightings of raptors as individual records using the BLA incidental sighting survey protocol, but most observers are more likely to record less-common species using this approach, again resulting in over-reporting of scarce species.

The Woodville surveys provide insights into the differences in raptor occurrence across the landscape (e.g. the Woodville surveys record more Accipiter species than Morpeth because of its proximity to woodland). Conducting whole-of-

month inventories of occurrence at an array of survey sites has the potential to increase knowledge of regional raptor populations.

CONCLUSIONS

Whole-of-month surveys on a property at Woodville provided valuable insights into the raptor populations of the area despite the lack of rigor associated with the method of data acquisition. The results were generally consistent with those from a more rigorous study at the Morpeth WWTW and studies elsewhere in the Hunter Region (Williams 2019).

ACKNOWLEDGEMENTS

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