Short Note (短 報)

**Merops Migration at Tanjung Tuan, Malaysia: An Important Spring
Bee-eater Migration Watchsite in South-east Asia**

Robert DeCandido^{*1)}, Deborah Allen^{**2)} and Reuven Yosef^{*3)}

Abstract. Counts of migrating Blue-tailed Bee-eaters *Merops philippinus* and Blue-throated Bee-eaters *M. viridis*, were made in March 2000 and 2001 at Tanjung Tuan, a coastal migration watchsite in western Malaysia. A total of 2,226 bee-eaters of these two species (12.9 bee-eaters/hour) was counted on 26 days of observation in these two seasons. The Blue-tailed Bee-eater comprised 60.8% (1,353 birds) of bee-eaters that could be identified, whereas the Blue-throated Bee-eater was much less abundant, comprising 10.0% of the individuals (222). Significantly more bee-eaters were counted when winds had a westerly component (NW, W or SW) than when winds were from other directions. Bee-eater migration is a regular and predictable event at Tanjung Tuan each spring, leading us to recommend that additional spring counts be made at this Southeast Asian migration watchsite.

Key words: Blue-tailed Bee-eater *Merops philippinus*, Blue-throated Bee-eater *M. viridis*, Malaysia, Migration.

キーワード: ハリオハチクイ *Merops philippinus*, ルリノドハチクイ *M. viridis*, マレーシア, 渡り.

Introduction

Since the 1950s, wintering populations of birds such as Oriental Honey-buzzards *Pernis ptilorhynchus orientalis* have been known to migrate northeast from Sumatra across the Straits of Malacca to the west coast of Malaysia (Oakeley 1955, Medway & Nisbet 1965, Wells 1990). It was only recently discovered that a significant migration of Blue-tailed Bee-eaters *Merops philippinus* and Blue-throated Bee-eaters *M. viridis* also utilized this same route each spring (Medway & Wells 1976, Fry *et al.* 1992, Wells 1999). These bee-eaters are likely returning to breed north of Indochina, probably in southern China east to Hong Kong (see Fry *et al.* 1992, Duckworth *et al.* 1999). Honey-buzzards are presumably returning to nest in southeastern Siberia and western China (McClure 1998, Wells 1999). The magnitude, seasonal duration and phenology of the migration along this East Asian flyway remain unclear however (Zalles & Bildstein 2000).

We present data on bee-eater migration from Tanjung Tuan (Cape Rachado) of

Received 1 July 2003, Revised 4 December 2003, 2nd Revision 20 February 2004, Accepted 14 April 2004.

* International Bird Research Center, P.O. Box 774, 88106 Eilat, Israel.

** The Linnaean Society of New York, P.O. Box 1452 Peter Stuyvesant Station, New York, N.Y. 10009, U.S.A.

¹⁾ E-mail: rdcny@earthlink.net

²⁾ E-mail: dallenyc@earthlink.net

³⁾ E-mail: ryosef@eilatcity.co.il

peninsular Malaysia. The location is a *Hawks Aloft Worldwide* watchsite near the town of Port Dickson, 94 km southwest of the capital of Kuala Lumpur. We discuss use of the site and the bee-eater migration by biologists for monitoring populations of migratory East Asian birds (Zalles & Bildstein 2000).

Methods

Port Dickson (2° 24' N, 101° 51' E, sea-level) is a small town on the west coast of Malaysia situated on the Straits of Malacca, approximately 94 km southwest from Kuala Lumpur. It is located at the southern end of a south to north range of mountains that presumably funnels spring migrants north along the western lowlands of the Malay Peninsula (Medway & Nisbet 1965, Wells 1999). The watchsite (known locally as Tanjung Tuan and also Cape Rachado) is situated on the deck of a lighthouse, south of Port Dickson at km 16, approximately 3 km west of the coastal highway. The lighthouse is surrounded by coastal evergreen rainforest in a small, protected forest reserve. On clear days it is possible to see Sumatra approximately 38 km across the Straits of Malacca to the southwest. This is the shortest overwater distance along the Straits from Tanjung Medang on the island of Pulau Rupat of northwestern Sumatra (Zalles & Bildstein 2000).

The watchsite, a lighthouse built by the Dutch in the 18th century, sits atop a rocky peninsula that extends into the Straits of Malacca on Malaysia's west coast and provides a 180-degree view to the west, south and north. The location afforded the best view of arriving bee-eaters since it overlooked the surrounding forested hills and the Straits below. The site has also been known as a good place to view the spring arrival of migrating raptors to mainland Asia (Oakeley 1955, Medway & Nisbet 1965, Wells 1990). However, it has only recently been documented that two species of bee-eaters and several species of swifts and swallows regularly occur there as migrants each spring (Medway & Wells 1976, Fry *et al.* 1992, Wells 1999).

Two species of migrating bee-eaters, the Blue-tailed and the Blue-throated, were counted during early to mid-March in 2000 and again in 2001 by two observers (DA and RDC) using 8.5× and 10× binoculars. In 2000, 104 hours of observations were made on 15 days (8 March–22 March). In 2001, observations were made for 68 hours on 11 days (2 March–12 March). Observations usually began at 9–10 am local time since information provided to us by lighthouse staff and observations by other observers from 1960 to 1983, indicated that minimal diurnal bird migration occurred at the site before 9 am. Observations usually ended by 4 pm each day unless migrants were still being observed after 3 pm.

DA assisted, acting primarily as a spotter while photographing the migration; RDC identified, counted, and recorded the numbers of bee-eaters seen. Most bee-eaters (70.8%) were readily identified to species (see Jeyarajasingham & Pearson (1999) for descriptions of the two *Merops* species). Scientific names follow Clements (2000). Weather conditions typically were hazy-cloudy with little wind in the morning till 10 am, then becoming clear but humid. On many days at approximately 10 : 45 am, a 3–12 km/h sea breeze from the west/northwest would begin. On certain days the wind direction

and speed changed significantly in subsequent hours. Wind direction was measured by recording the reading shown on the weather vane mounted atop the lighthouse, and comparing that reading to a hand-held compass with heading on the lighthouse deck.

Both RDC and DA scanned mainly to the west across the Straits of Malacca in the direction of Sumatra from the deck of the lighthouse watchsite. Bee-eaters of two species, the Blue-tailed and the Blue-throated, were considered migrants if they passed west-to-east across an imaginary north-south line at the watchsite, and continued west and out of sight past the lighthouse and nearby hills. Occasionally, migrants did not pass the immediate area of the watchsite but continued on a northeast course over the Straits of Malacca, presumably making landfall north of the lighthouse. For data analysis, we pooled the number counted of both bee-eater species along with *Merops* individuals we could not identify to species level. We chose this procedure since we collected migration data in two different years during two different time frames in March. Also, almost 30% of *Merops* individuals we counted in 2000–01 could not be identified to species.

It was hypothesized that more bee-eaters were counted from the watchsite when winds had a westerly component (NW, W or SW) than when winds were from other direction (N, NE, E, SE or S). We used a Chi square test with one degree of freedom to analyze the effect of wind direction upon the number of bee-eaters making landfall at the Cape.

Individuals of several other non-passerine species were also counted in migration in 2000–01 including five species of raptors: Black Baza (*Avecida leuphotes*), Chinese Goshawk (*Accipiter soloensis*), Grey-faced Buzzard (*Bustatur indicus*), Japanese Sparrowhawk (*Accipiter gularis*) and Oriental Honey-buzzard (*Pernis ptilorhynchus orientalis*). Other species were only noted as migrants, and no systematic count was made: Fork-tailed Swifts (*Apus pacificus*), House Swifts (*Apus nipalensis*), and Pacific Swallows (*Hirundo tahitica*).

Results

Most bee-eaters counted were migrating west-to-east within 100 m of the watchsite, and were only observed traveling in loose flocks. Almost all bee-eaters were first heard calling as part of the flock before being seen by DA or RDC. Once heard, flocks then could be located visually and eventually identified to species on most occasions. Bee-eaters approaching the lighthouse utilized flapping-flight interspersed with glides, and occasionally soaring upwards on air currents generated by a sea-breeze. Bee-eaters first heard and then observed over the water typically passed the watchsite within 2–3 minutes. Those making landfall in the lighthouse area usually arrived at or below eye-level and circled up on updrafts and continued eastward. Only a few flocks arrived in flapping-flight above the observers. Occasionally flocks would stop to rest for up to 10 minutes on exposed branches in the area of the lighthouse before continuing eastward.

In 2000–01, a total of 2,226 bee-eaters of two species (12.9 birds/hour) were counted during 26 total observation days. These included 1,353 Blue-tailed Bee-eaters (60.8%), 222 Blue-throated Bee-eaters (10.0%) and 651 unidentified individuals (29.2%). Figure

Fig. 1. Total number of bee-eaters counted in migration by hour of the day at Tanjung Tuan, Malaysia in March of 2000 and 2001.

1 shows the hourly count of all bee-eater migrants for 2000–01. Most bee-eaters were seen from 11 am–2 pm (57.0%) with 11 am–12 pm being the peak hour. By comparison, we could not determine the peak of the seasonal migration for either species from this study since our data were collected in two seasons, and almost 30% of the migrating bee-eaters could not be identified to species.

The highest single-day count of migrating bee-eaters was 326 occurring on 21 March 2000. The highest hourly total occurred between 1–2 pm also on 21 March 2000 when 101 Blue-tailed Bee-eaters were counted. Significantly higher numbers of bee-eaters made landfall at or near the lighthouse when winds had a westerly (NW to SW) component than when winds were from other directions ($\chi^2 = 297.9$, $P < 0.05$). High totals of bee-eaters arrived at the Cape on moderate to strong (16–32 km/h) westerly winds as on 17 March 2000 when 254 were counted, and on 19 March 2000 when 248 were counted. However, on 21 March 2000, the highest total of bee-eaters (326) in the two seasons of this study was counted on light (< 10 km/h), East-Northeast to Southeast winds.

Usually at Tanjung Tuan in spring, once the first flock of bee-eaters arrived at the Cape, scattered flocks would follow for four to six hours each day on most days, especially after 10 March. Exceptionally, bee-eater migration would last for seven (17 March 2000) to eight (21 March 2000) consecutive hours on a given day. On peak flight days, the arrival of bee-eaters began at 9–10 am (17 March; 20 March; 21 March; all 2000). On only one occasion was a small flock seen before 9 am. Flocks were not usually seen after 4 pm, and no bee-eaters were recorded migrating after 5 pm in the two seasons of this study.

Discussion

Tanjung Tuan on west coastal Malaysia has been known as a significant migration

watchsite for other non-passerine birds such as raptors that are returning from Sumatra to the Asian mainland (see Oakeley 1955, Medway & Nisbet 1965, Wells 1990). However, only casual observations have been made of the two *Merops* species, the Blue-tailed and the Blue-throated Bee-eater, that utilize this same route each spring (see Medway & Wells 1976, Wells 1999). In other locations in Southeast Asia, the few published bee-eater migration accounts present data from single day(s) of observation (see David-Beaulieu 1944, 1949a, 1949b, 1950, Melville & Fletcher 1982, Tizard 1996, Evans 2001). The only long-term study of migrating bee-eaters comes from Hong Kong (Carey *et al.* 2001). Even there, data are based upon a small sample size: a maximum 30-year aggregate total of 30–40 individuals counted by week in spring from 1958–1998.

The location of Tanjung Tuan, a north to south peninsula extending into the Straits of Malacca, combined with local weather conditions at the watchsite and in Sumatra, are key factors in determining the large number of Blue-tailed and Blue-throated Bee-eaters that arrived at the Cape in migration each spring. The highest hourly totals for bee-eaters tallied in 2000–01 (Fig. 1) show a peak between 11 am–12 pm and were likely correlated with (1) the first strong thermals forming over Sumatra to initiate an overwater crossing, beginning at about 10 am and (2) the onset of a sea-breeze. That some flocks were seen in migration before 11 am (Fig. 1) indicates that bee-eaters are less dependent on thermals than soaring migrants such as broad-winged raptors, and will utilize active (flapping) flight to a greater degree in passage. Each of these possibilities warrants additional investigation, as do the factors that initiate movements of particularly large numbers of bee-eaters. In any event, conditions in Sumatra probably play the most important role in determining the extent and timing of bee-eater migration at the Cape on any given day.

Significantly more bee-eaters were counted at the Cape when winds had a westerly component (NW, W or SW) than when winds were from other directions. High total numbers of bee-eaters were counted on days when the winds had a strong (>20 km/h) westerly component. It may be that when bee-eaters are subject to moderate to strong westerly winds, the Cape is the most propitious point to make landfall since it represents the shortest overwater crossing from Sumatra. However, more research needs to be done to determine the precise effects of wind direction and speed upon the number of bee-eaters that make landfall in spring at Tanjung Tuan.

Also still unclear is the magnitude of the flight which to date has been censused for only relatively brief periods of time at Tanjung Tuan in spring (occasional single-day observations made from 1960–1983; 15 consecutive days in 2000; 11 consecutive days in 2001). The 2000–01 migration data for the Blue-tailed Bee-eaters and the Blue-throated Bee-eaters are the first attempt to quantify this recently documented *Merops* migration at the Cape. Based on our counts, we estimate that approximately 5,000 bee-eaters make landfall at the Cape each spring. We believe that there will be 15 or so days on which an average of 250 bee-eaters are observed in migration in March and April, as well as other days when fewer are counted.

Although Wells (1999) does not provide any estimates of the number of migrants of either species in spring at Tanjung Tuan, he does provide information collected from observers regarding the phenology of spring migration for these two bee-eater species.

Blue-tailed Bee-eaters have been seen in migration beginning in early March, with a peak in late March and early April. Few flocks seem to make landfall at Tanjung Tuan by May, but just north of the lighthouse in Kuala Selangor, migrant(s) were seen on 25 May (Jeyarajasingham unpublished data, cited in Wells 1999). By comparison, Blue-throated Bee-eaters have been noted in migration somewhat earlier (23 January over Singapore), with the earliest accepted date at Tanjung Tuan of 11 February (Wells 1999). The peak of the Blue-throated migration seems to be in March through early April with some arrivals until early May. The latest date of arrival at Tanjung Tuan is 7 May (Wells 1999). Further north in Hong Kong as part of a long-term study of migrating birds, observers have also noted a greater proportion of Blue-tailed vs. Blue-throated Bee-eaters each spring, with the peak of the Blue-tailed Bee-eater migration occurring between 16 April and 8 May (Carey *et al.* 2001).

Perhaps the most difficult question to address from the data collected to date at Tanjung Tuan is where are these north-bound bee-eaters returning to nest in Asia? The bee-eater migration dates recorded in 2000–01 at Tanjung Tuan accord with those observed in Hong Kong from 1958–1998, and these could represent individuals of the same populations (see Carey *et al.* 2001). However, both the Blue-tailed and the Blue-throated breed over a wide latitudinal range, in different climates and habitats. It is quite possible there are differences in overwintering areas used within and outside Sumatra, and differences in timing of breeding at different latitudes. Migration timing would therefore also be expected to differ between populations. Many populations of Blue-tailed Bee-eaters are already nesting by February in Indochina, and it is unlikely that migrants observed in March–April at Tanjung Tuan are from populations returning to breed in north and central Thailand, Laos, Cambodia, Vietnam and environs (see Duckworth *et al.* 1999, Evans 2001). Further bee-eater migration surveys are needed at Tanjung Tuan and elsewhere in South-east Asia to determine the timing and migration phenology of these two species.

Acknowledgments

We sincerely appreciate the encouragement and thoughtful advice of members of the Malaysian Nature Society including Laurence and Audrey Poh, Liew Siew Lan and Ooi Beng Yean, Regina Anthony and Chiu Sein Chong, Cheang Kum Seng, and Lim Aun Tiah. Dr. William Duckworth of the Wildlife Conservation Society provided the authors with many helpful ideas and historical references regarding *Merops* spp. in Indochina. Jevgeni Shergalin, of the Hawk Mountain Sanctuary Acopian Center for Conservation Learning, provided important reference material regarding Southeast Asian *Merops* migration. David Melville and Dr. David Wells read a version of this manuscript and provided helpful comments. We wish to acknowledge the hospitality shown to us by members of the Tanjung Tuan lighthouse staff.

References

- David-Beaulieu, A. 1944. *The Birds of Tranninh*. Indochinese University, Hanoi
David-Beaulieu, A. 1949a. The birds of the province of Savannakhet (Southern Laos). *The Bird* 19: 41–84.

- David-Beaulieu, A. 1949b. The birds of the province of Savannakhet (Southern Laos). *The Bird* **19**: 153–194.
- David-Beaulieu, A. 1950. The birds of the province of Savannakhet (Southern Laos). *The Bird* **20**: 9–50.
- Carey, G. J., Chambers, M. L., Diskin, D. A., Kennerly, P. R., Leader, P. J., Leven, M. R., Lewthwaite, R. W., Melville, D. S., Turnbull, M. & Young, L. 2001. *The Avifauna of Hong Kong*. Hong Kong Bird Watching Society, Hong Kong.
- Clements, J. F. 2000. *Birds of the World: A Checklist*. Ibis Publishing Company, Vista.
- Duckworth, J. W., Davidson, P. & Timmins, R. J. 1999. Birds. In *Wildlife in Lao PDR: 1999 Status Report* (compilers, J. W. Duckworth, R. E. Salter & K. Khounboline), pp. 69–159. IUCN—The World Conservation Union/Wildlife Conservation Society/Centre for Protected Areas and Watershed Management, Vientiane.
- Evans, T. D. 2001. Ornithological records from Savannakhet Province, Lao PDR, January–July 1997. *Forktail* **17**: 21–28.
- Fry, C. H., Fry, K. & Harris, A. 1992. *Kingfishers, Bee-eaters and Rollers: A Handbook*. Princeton University Press, Princeton, NJ, U.S.A.
- Jeyarajasingham, A. & Pearson, A. 1999. *A Field Guide to the Birds of West Malaysia and Singapore*. Oxford University Press, New York.
- McClure, H. E. 1998. *Migration and Survival of the Birds of Asia* (Rev. ed.). White Lotus Press, Bangkok.
- Medway, L. & Wells, D. R. 1976. *The Birds of the Malay Peninsula*. Vol. 5. Whitherby, London.
- Medway, L. & Nisbet, I. C. T. 1965. Bird Report: 1964. *Malayan Nature Journal* **19**: 160–194.
- Melville, D. S. & Fletcher, W. B. 1982. Diurnal observations of bird migration in central and western Thailand. *Natural History Bulletin of the Siam Society* **30**: 49–50.
- Oakeley, R. N. 1955. Migrating hawk-eagles. *Malayan Nature Journal* **10**: 163–164.
- Tizard, R. J. 1996. *A Preliminary Wildlife and Habitat Survey of the Proposed Northern Extension to the Nakai-Nam Theun National Biodiversity Conservation Area and Adjacent Nam Gnouang Area, Lao PDR*. Centre for Protected Areas and Watershed Management/Wildlife Conservation Society, Vientiane.
- Wells, D. R. 1990. Malayan bird report: 1982 and 1983. *Malayan Nature Journal* **43**: 116–147.
- Wells, D. R. 1999. *The Birds of the Thai-Malay Peninsula*. Academic Press, London.
- Zalles, J. I. & Bildstein, K. L. 2000. *Raptor Watch: A Global Directory of Raptor Migration Sites*. Birdlife International, Cambridge; Hawk Mountain Sanctuary, Kempton.

マレーシア、タンジュントゥアン（東南アジアにおける春季に渡る ハチクイ類の重要な観察地）におけるハチクイ類の渡り

マレーシア西部、海岸近くの渡り鳥観察地であるタンジュントゥアンにおいて、2001 と 2002 年の 3 月に、渡り途中のハリオハチクイ *Merops philippinus* とルリノドハチクイ *M. viridis* の個体数をカウントした。両年合わせて 26 日間で計 2,226 羽 (12.9 羽/h) のハリオハチクイとルリノドハチクイが出現した。そのうちの 60.8% (1,353 羽) がハリオハチクイ、10.0% (222 羽) がルリノドハチクイであった。両種のハチクイは、他の風向きと比べて西方向（北西、西、南西）の風が吹いたときに、多く出現した。タンジュントゥアンでは、渡り途中のハチクイが春期に定期的に出現し、今後とも出現すると予測されることから、この東南アジアの渡り鳥観察地において、春期のカウントを今後も行いたい。

ロバート・デカンディド: International Bird Research Center, P.O. Box 774, 88106 Eilat, Israel.

デボラ・アレン: The Linnaean Society of New York, P.O. Box 1452, Peter Stuyvesant Station, New York, N.Y. 10009, U.S.A.

ルーベン・ヨゼフ: International Bird Research Center, P.O. Box 774, 88106 Eilat, Israel.