because they showed: a relatively long, conical bill; heavily chestnut-tinged uppertail-coverts and rump; and a dark crown. All three birds were aged as immature on account of their pale yellow undertail-coverts, fawn underparts and worn yellowish flanks. Earlier published checklists for Bangladesh list four *Emberiza* species (see above), but none mentions *E. melanocephala*; hence it can be considered a new species for Bangladesh.

Black-headed Bunting breeds in the western Palaearctic and Iran. It winters mainly in cultivated fields in southern Pakistan, west and central India and infrequently eastern Nepal and eastern India, with a few recent records from Jalpaiguri, West Bengal (S. Sen pers. comm. 2011). It has a known tendency to vagrancy further east with records from South-East Asia in north-west, central and southern Thailand, Singapore, northern Laos, northern Vietnam (Byers *et al*. 1995, Rasmussen & Anderton 2005, Robson 2008), southern China, Japan and northern Borneo (Dymond 1999).

Acknowledgements

I am extremely thankful to Paul Thompson, Nick Dymond and Alex Lees for their comments on the Black-headed Bunting photos to confirm identification and for their comments on the draft of this paper. I am also thankful to Sumit Sen for providing current information on West Bengal and Assam. I am grateful to Farhad Pavel, M. Abdullah Abu Diyan, Ronald Halder, Shimanto Dipu, Zamiruddin Faisal, Samiul Mohsanin, Saniar Rahul, Enam Talukder, Shama Hoque, Enam Ul Haque, Mayeen Uddin, Sirajul Hossain, Monirul Khan and Dilip Das for their wonderful company in the field. Special thanks are due to all my colleagues at Bangladesh Bird Club and Wildlife Trust of Bangladesh for their support and encouragement.

References

Ali, S. & Ripley, S. D. (1987) *Compact handbook of the birds of India and Pakistan together with those of Bangladesh, Nepal, Bhutan and Sri Lanka*. Second edition. Delhi: Oxford University Press.

Byers, C., Olsson, U. & Curson, J. (1995) *Buntings and sparrows*. Sussex: Pica Press.

Dymond, N. (1999) Two records of Black-headed Bunting *Emberiza melanocephala* in Sabah: the first definite occurrence in Malaysia and Borneo. *Forktail* 15: 102–103.

Grewal, B., Harvey, B. & Pfister, O. (2002) *Birds of India including Nepal, Sri Lanka, the Maldives, Pakistan, Bangladesh and Bhutan*. London: Christopher Helm.

Grimmett, R., Inskipp, C. & Inskipp, T. (1998) *Birds of the Indian Subcontinent*. London: Christopher Helm.

Harvey, W. G. (1990) *Birds in Bangladesh*. Dhaka: University Press.

Husain, K. Z. (1979) *Birds of Bangladesh*. Dhaka: Government of Bangladesh.

IUCN Bangladesh (2000) *Red book of threatened birds of Bangladesh*. Dhaka: IUCN.

Khan, M. A. R. (1982) *Wildlife of Bangladesh: a checklist*. Dhaka: University of Dhaka.

Khan, M. M. H. (2008) *Protected areas of Bangladesh: a guide to wildlife*. Dhaka: Nishorgo Program, Bangladesh Forest Department.

Rashid, H. (1967) *Systematic list of the birds of East Pakistan*. Publication no. 20. Dacca: Asiatic Society of Pakistan.

Rasmussen, P. C. & Anderton, J. C. (2005) *Birds of South Asia: the Ripley guide*. Washington, D.C. and Barcelona, Spain: Smithsonian Institute and Lynx Edicions.

Robson C. (2008) *Birds of South-East Asia*. London: New Holland Publishers, Ltd.

Siddiqui, K. U., Islam, M. A., Kabir, S. M. H., Ahmed, A. T. A., Rahman, A. K. A., Haque, E. U., Ahmed, Z. U., Begum, Z. N. T., Hassan, M. A., Khondker, M. & Rahman, M. M., eds. (2008) *Encyclopedia of flora and fauna of Bangladesh*, Vol. 26. Birds. Dhaka: Asiatic Society of Bangladesh.

Thompson, P. M., Harvey, W. G., Johnson, D. L., Millin, D. J., Rashid, S. M. A., Scott, D. A., Stanford, C. & Woolner, J. D. (1993) Recent notable bird records from Bangladesh. *Forktail* 9: 12–44.

Thompson, P. M. & Johnson, D. L. (2003) Further notable bird records from Bangladesh. *Forktail* 19: 85–102.

***Sayam U. CHOWDHURY**, House- 1 (B-3), Road-7, Sector-4, Uttora, Dhaka-1230, Bangladesh. Email: sayam_uc@yahoo.com*

Autumn migration of an Amur Falcon *Falco amurensis* from Mongolia to the Indian Ocean tracked by satellite

ANDREW DIXON, NYAMBAYAR BATBAYAR and GANKHUYAG PUREV-OCHIR

Introduction

Amur Falcons *Falco amurensis* breed in the Eastern Palearctic from Transbaikalia, Russia and central Mongolia east to Ussuriland (south-eastern Russian Far East) and south to the Qinling Mountain range in central China (Ferguson-Lees & Christie 2001). This small falcon undertakes one of the most notable migrations of any bird of prey, migrating between its east Asian breeding range and its southern African wintering range. Amur Falcons depart their breeding areas in late August and September and form large migratory flocks, moving south through China skirting the eastern edge of the Himalaya to reach north-east India and Bangladesh, where they settle temporarily to fatten before embarking on the latter stage of the migration through the Indian subcontinent and across the Indian Ocean to equatorial Africa (Clement & Holman 2001, Bildstein 2006). The journey of 3,000 km across the Indian Ocean typically takes place in late November and December, aided by the prevailing easterly winds (Bildstein 2006, Anderson 2009).

The Amur Falcon is not uncommon across most of its breeding range, although detailed information on its population status and trends is lacking (Ferguson-Lees & Christie 2001). It is a common breeding species in the major river valleys of the forest steppe zone of central and eastern Mongolia, where it typically occupies old nests of Eurasian Magpies *Pica pica* for breeding. Currently there are no major conservation concerns for the species, although it is known to be harvested for food during autumn passage through north-east India (Naoroji 2006). Satellite telemetry allows the routes of migrating raptors to be mapped (Meyberg & Fuller 2007), whilst the recent development of lightweight transmitters (<9.5 g) has enabled the technology to be applied to small migratory falcons such as Eleonora's Falcon *F. eleonorae* (Gschweng *et al*. 2009, López-López *et al*. 2009) and Hobby *F. subbuteo* (Meyburg *et al*. 2011). In this paper we describe the autumn migration pathway of a single Amur Falcon fitted with a satellite transmitter at its breeding site in central Mongolia as part of a pilot study for implementing the activities listed in the Convention on Migratory Species (CMS) African-Eurasian Migratory Birds of Prey Memorandum of Understanding.

Methods

An adult female Amur Falcon was trapped on 21 July 2009 at its nesting site (47°39′43.0"N 105°51′53.8"E, altitude 1,378 m) in the Khustayn Nuruu National Park, Tov Province, central Mongolia. We fitted a 9.5 g solar-powered satellite transmitter (PTT-100, Microwave Telemetry Inc., Columbia, MD, USA) by means of a Teflon ribbon harness (Kenward 2001). The duty cycle of the satellite transmitter was programmed for 10 hours on and 48 hours off. The total weight of the PTT and harness was 11 g. The bird weighed 199 g when trapped, so the PTT and harness represented c.5.5% of its body weight. Its wing length was 228 mm (maximum chord), tarsus 30.9 mm, tail length 119 mm, wingspan 690 mm, and total body length 282 mm.

After release at the capture site, the bird made several circles overhead and landed on a hill opposite from where we were standing. After resting and making an apparent effort to get rid of the transmitter for about five minutes, it took off and flew towards its nest site.

Satellite data was provided in DIAG format by Argos, extracted using the MTI Data Parser and plotted in Google Earth.

Results

The coverage period for our satellite tracking lasted 131 days from the date of deployment on 21 July to the last transmission on 28 November 2009. During this time, we received 58 locations on 29 days (Table 1). The accuracy of the location data, based on Argos location classes, was generally low (Table 2). Despite the low frequency and quality of location data, we were able to plot the migration pathway of the bird from Mongolia to the Indian Ocean (Fig. 1).

Location data came from within the breeding area in the Khustayn Nuruu National Park until late August, when the bird shifted some 65 km north, between 21 and 31 August. It remained in this post-breeding settlement area until at least 12 September. It was located 350 km south-east in Dundgovi Province by 14 September and the next location came from Inner Mongolia, China, on 22 September. The bird remained in this part of Inner Mongolia until at least 11 October before being located 680 km SSE in Henan, central China, on 18 October.

There were no further location data received from the PTT until 1 November, by which time the bird was near Hanoi, Vietnam, 1,650 km SSW of its location two weeks earlier. Three days later it was located 960 km W near Mandalay in central Myanmar. By 9 November, it had crossed the plains of the Irrawaddy and Chindwin River systems to reach the Chin Hills and crossed the Indian border into Manipur by 11 November. It remained in north-east India until 21 November, from where it headed south-west to the Bay of Bengal and along the eastern seaboard of India to reach Andhra Pradesh by the 26 November. The final location data received for this bird came some 63 hours later on 28 November, after it had travelled a further 1,780 km WSW. It was last located above the Indian Ocean 1,180 km off the coast of Goa. In total, the bird was tracked along a pathway of 8,145 km over a period of 78 days (12 September to 28 November).

Table 1. Location, timing, distance and direction of female Amur Falcon movements tracked by satellite from 12 September to 28 November 2009.

Location	Lat (N)/Lon (E)	Date/Time (UTC)	Distance/ Direction
Tov Province, Mongolia	48°11'/105°48'	12 Sep/13:04	na
Dundgovi Province, Mongolia	45°27'/107°50'	14 Sep/21:29	340 km/152°
Inner Mongolia, China	40°39'/110°02'	22 Sep/03:09	510 km/161°
Inner Mongolia, China	40°40'/110°02'	11 Oct/14:39	55 km/156°
Henan, China	34°46'/112°06'	18 Oct/13:51	680 km/163°
Ha Tay, Vietnam	29°58'/105°37'	01 Nov/22:57	1650 km/204°
Mandalay, Myanmar	21°33'/96°25'	04 Nov/10:28	960 km/275°
Manipur, India	23°58'/93°33'	11 Nov/20:10	390 km/313°
Mizoram, India	24°14'/93°00'	21 Nov/15:24	65 km/296°
Bay of Bengal	19°42'/87°51'	24 Nov/01:20	730 km/227°
Andhra Pradesh, India	16°21'/79°28'	26 Nov/11:44	960 km/248°
Indian Ocean	12°23'/65°36'	28 Nov/16:19	1,555 km/255°
Indian Ocean	12°03'/63°32'	28 Nov/23:28	225 km/260°

Table 2. PTT data for the female Amur Falcon tracked from Mongolia to the Indian Ocean. Location classes (LC) assigned by Argos are radial error distances: LC3 <250 m, LC 2 250–500 m, LC1 500–1,500 m, LC0 >1,500 m, LCA and LCB unbounded, LCZ invalid.

	Days	Locations	Loc. days	LC3	LC2	LC1	LC0	LCA	LCB	LCZ
July	11	4	4	0	0	0	0	1	1	2
August	31	4	2	0	2	1	0	1	0	0
September	30	10	8	0	0	0	0	5	5	0
October	31	2	2	0	1	0	0	0	1	0
November	28	38	13	0	2	1	15	9	10	1
TOTALS	**131**	**58**	**29**	**0**	**5**	**2**	**15**	**16**	**17**	**3**

Figure 1. Autumn migration pathway of adult female Amur Falcon tracked from its breeding territory in central Mongolia to the Indian Ocean from 12 September to 28 November 2009.

The movement from the post-breeding settlement area in central Mongolia to north-east India covered a pathway of 4,585 km and took 60 days. During this first stage of the autumn migration the bird utilised at least one stopover site in Inner Mongolia, where it remained for 17–32 days. It arrived in north-east India sometime between 4 and 11 November and left the region between 21 and 23 November. On leaving north-east India from 21 to 28 November, it travelled 3,470 km in 176 hours (average 473 km/day). At this stage, it was also migrating at night, with location data obtained during a flight over the sea in the Bay of Bengal from 02h49 to 08h20 (local time UTC + 7 hrs) on 24 November, when the bird was c.140 km offshore. Over a period of 60 hrs from 26 to 28 November, the Amur Falcon covered a distance of 1,785 km, travelling at an average speed of 30 km/h.

Discussion

Prior to embarking on its autumn migration this satellite-tagged Amur Falcon shifted from its breeding territory to a post-breeding settlement area in late August, where it remained for at least two weeks, before embarking on its south-bound journey after 12 September. The early stages of migration through China were slow with at least one prolonged stopover in Inner Mongolia. Amur Falcons feed mainly on insects, especially grasshoppers, which are often extremely abundant on the grazed steppe grasslands of Mongolia and northern China (Le & Yonling 2008). The slow rate of passage in the early phase of migration suggests that much of the time the bird was foraging to build up energy reserves. This slow progress was unlikely to be related to moulting patterns as Amur Falcons completely moult their flight feathers in their African wintering grounds (Symes & Woodborne 2010), although some may begin moult in their breeding areas (Schäfer 2003). In the Lesser Kestrel *Falco naumanni*, a related species that also migrates from Mongolia to Africa, moult begins in the breeding area, is suspended during migration and recommences two weeks after arrival in their wintering grounds (McCann 1994).

Information on the migratory behaviour of Amur Falcons has previously come from observations of migrating flocks, which have provided a fairly well-described migration pathway, despite the fact that the migration routes of the species occur in remote and poorly watched areas of South-East Asia. Tordoff (2002) reviewed autumn records in South-East Asia, reporting movements through northern Laos in October, Chiang Mai province, northern Thailand in October and November and northern Vietnam in October, including over 1,400 passing through the Hoang Lien Nature Reserve in Lao Cao Province from 13–24 October 1997. Claims of wintering Amur Falcons in Yunnan, China (Li 2004), could possibly be attributed to passage birds in this province during November. These observational records suggest that Amur Falcons migrate on a broad front, perhaps extending c.1,000 km from the Hengduan Shan to the Gulf of Tongkin, although some birds may cross the Himalayas in central Nepal (Bildstein 2006) and further west in Uttarakhand Province, India (Naoroji 2006).

The female Amur Falcon in our study made a detour not just around the eastern edge of the Tibetan Plateau, but also around the extensive north–south mountain chains of western Yunnan. By avoiding crossing the Gaoligong and Wuliang mountain ranges, the route taken by this individual involved an extended southward journey to northern Vietnam followed by a westward movement to north-east India, before crossing the Indian subcontinent to reach the Indian Ocean near Goa; a total distance of 6,935 km. The direct (great circle) flight line from central Mongolia to Goa is 4,690 km; the observed pathway taken by our satellite-tracked individual was thus 48% longer. This circuitous route is probably not unusual, given the records of Amur Falcons in this part of South-East Asia (Tordoff 2002). Observations of migrating flocks indicate that most migrating Amur Falcons avoid crossing the Himalayas, presumably because to do so would present a great physiological challenge to the birds, with limited foraging opportunities along the route.

After avoiding the Himalayas, Amur Falcons must head westwards or north-westwards, depending on how far south they have travelled in South-East Asia, through Myanmar to north-east India and Bangladesh. Passage through Myanmar and north-east India is slow (this satellite-tagged bird took 17 days to cover a distance of 455 km) and huge numbers congregate in the region during October and November (Naoroji 2006, Choudhury 2009). This slow progression presumably enables Amur Falcons to build up fat reserves, by feeding on termites, ants and other insects for the long-distance movement across India and the Indian Ocean to Africa (Ali & Ripley 1978, Naoroji 2006).

Observational records suggest that Amur Falcon migration takes places over a relatively broad front across the Indian continent (Naoroji 2006). This bird moved along the eastern seaboard and then west through Andhra Pradesh to the Goa/Karnataka coast, and out into the Indian Ocean. It is probable that the Amur Falcon died during this long-distance sea crossing, although PTT failure cannot be ruled out especially given its intermittent performance over the whole tracking period. We can only speculate about the location of landfall on the African continent. The route taken suggests that the bird was heading towards the coast of Somalia, a minimum distance of 2,590 km from its coastal departure point in India. From Andhra Pradesh to its last location the falcon travelled 1,780 km in 60 hours (c.30 km/h). The ocean crossing would have taken approximately 87 hours to complete at this speed. It is possible that Amur Falcons can feed on migratory dragonflies that also fly across the Indian Ocean from India to East Africa, possibly utilising north-easterly tail-winds within and behind the Inter-tropical Convergence Zone, at altitudes over 1,000 m (Anderson 2009).

Stable isotope analysis of juvenile feathers has been used to determine that Amur Falcons wintering in South Africa originated from a wide area of their Asian breeding range (Symes & Woodborne 2010), although none of the 39 birds sampled appeared to have originated from the region west of Ulaanbaatar in Mongolia. In addition, a recent satellite telemetry study tracked five adult Amur Falcons from their wintering grounds in South Africa to their breeding grounds in north-eastern China (Meyburg & Meyburg 2010). It is possible that Amur Falcons originating from northern Mongolia may winter north of South Africa.

Acknowledgements

Funding for this study was provided by the Environment Agency Abu Dhabi, UAE and was undertaken within the framework of a MoU with the Ministry of Nature, Environment and Tourism, Mongolia. We wish to thank Amarkhuu Gungaa, Mohammed al Bowardi, Salim Javed, Anthony van Zyl and Jevgeni Shergalin. We thank David Buckingham and two anonymous referees for improving an earlier version of this manuscript.

References

Ali, S. & Ripley, S. D. (1978) *Handbook of the Birds of India & Pakistan together with those of Bangladesh, Nepal, Bhutan and Sri Lanka*, 1. Second Edition. Delhi: Oxford University Press.

Anderson, R. C. (2009) Do dragonflies migrate across the western Indian Ocean? *J. Trop. Ecol.* 25: 347–358.

Bildstein, K. L. (2006) *Migrating raptors of the world: their ecology and conservation*. Ithaca: Cornell University Press.

Choudhury, A. (2009) Significant recent ornithological records from Manipur, north-east India, with an annotated checklist. *Forktail* 25: 71–89.

Clement, P. & Holman, D. (2001) Passage records of Amur Falcon *Falco amurensis* from SE Asia and southern Africa including first records from Ethiopia. *Bull. Brit. Orn. Club* 121: 222–230.

Ferguson-Lees, J. & Christie, D. A. (2001) *Raptors of the world*. London: Christopher Helm.

Gschweng, M., Kalko, E. K. V., Querner, U., Fielder, W. & Berthold, P. (2008) All across Africa: highly individual migration routes of Eleonora's Falcon. *Proc. R. Soc. B* 275: 2887–2896.

Kenward, R. E. (2001) *A manual for wildlife radio-tagging*. London: Academic Press.

Le, K. & Yonglin, C. (2008) Dynamics of grasshopper communities under different grazing intensities in Inner Mongolian steppes. *Insect Science* 2: 265–281.

Li, X. (2004) *Raptors of China*. Beijing: China Forestry Publishing House.

López-López, P., Liminana, L., Mellone, U. & Urios, V. (2009) Autumn migration of Eleonora's Falcon *Falco eleonorae* tracked by satellite telemetry. *Zoological Studies* 48: 485–491.

Meyburg, B.-U. & Fuller, M. R. (2007) Satellite tracking. Pp.242–248 in D. M. Bird & K. L. Bildstein, eds. *Raptor research and management techniques.* Surrey, BC, Canada: Hancock House Publishers.

Meyburg, B.-U. & Meyburg, C. (2010. Tracking the intercontinental migrations of small falcons. *Microwave Telemetry Inc. Tracker News* 11(2): 2.

Meyburg, B.-U., Howey, P. W., Meyburg, C. & Fiuczynski, K. D. (2011) Two complete migration cycles of an adult Hobby tracked by satellite. *British Birds* 104: 2–15.

McCann, K. I. (1994) Habitat utilization and time-energy budgets of the Lesser Kestrel *Falco naumanni* in its southern African non-breeding range. MSc thesis, University of Witwatersrand.

Naoroji, R. (2006) *Birds of prey of the Indian subcontinent*. London: Christopher Helm.

Schäfer, S. (2003) Studie an einer mongolischen Brutpopulation des Amurfalken (*Falco amurensis* Radde, 1863). Dipl. Biol. Thesis. Halle/Saale, Germany; Martin-Luther Universität Halle-Wittenberg.

Symes, C. T. & Woodborne, S. (2010) Migratory connectivity and conservation of the Amur Falcon *Falco amurensis*: a stable isotope perspective. *Bird Conserv. Internatn.* 29: 134–148.

Tordoff, A. W. (2002) Raptor migration at Hoang Lien Nature Reserve, northern Vietnam. *Forktail* 18: 45–48.

***A. DIXON**, International Wildlife Consultants (UK) Ltd., PO Box 19, Carmarthen, SA33 5YL, United Kingdom. Email: falco@falcons.co.uk*

***B. NYAMBAYAR & P. GANKHUYAG**, Wildlife Science and Conservation Center, Undram Plaza Office 404, Bayanzurkh District, Ulaanbaatar 51, Mongolia. Email: nyambayar@wscc.org.mn and gankhuyag@wscc.org.mn*

The recent increase of the Red-billed Starling *Sturnus sericeus* in the Republic of Korea

CHANG-YONG CHOI, JONG-GIL PARK, NIAL MOORES, EUN-MI KIM, CHANG-WAN KANG, HYUN-YOUNG NAM and SEOG-MIN KIM

The Red-billed Starling *Sturnus sericeus* is considered to have a stable population (BirdLife International 2009), and is mapped largely as resident in mainland East China (Brazil 2009). The species has, however, undergone a remarkable change in status in the Republic of Korea (ROK) during the past decade. It was first recorded on 16 April 2000 on Ganghwa Island, Gyeonggi Province (37°36′N 126°28′E) (Jin-Man Kim *in litt.* 2000, Kim & Choi 2007). The second record of the species followed within two weeks, on Gageo Island in Jeonnam Province (34°04′N 125°06′E), and there were further records in autumn 2000 and again during spring and autumn 2001 (N. Moores unpublished data). As a result of these records, Park (2002) suggested that the Red-billed Starling was likely to prove to be a regular migrant on islands along the west coast of the Korean Peninsula. Since then, the species has been found at many more locations, including during the breeding season.

There is some possibility that the species might have been previously overlooked, as the same decade also witnessed a rapid increase in ornithological activity in ROK, especially in coastal areas and on islands in the Korean West Sea (Yellow Sea), resulting in a corresponding increase in records of previously unrecorded or nationally scarce species (e.g. Moores 2007). Furthermore, prior to 2000, only a few observers in ROK were familiar with the Red-billed Starling. Has the increase in observer coverage and familiarity with the species been the main cause of its apparent increase of in ROK?

To help answer this question, we first compiled and reviewed observation records of the Red-billed Starling in ROK between 2000 and 2008. In the absence of a formal national process of record collation, this required gathering records from unpublished and published sources, including personal count data, survey and ornithological reports, media articles and specialised birding websites. We also contacted other experienced photographers and observers to confirm details of their observations (basically with photographs), including the date, location and number of birds picture taken and observed. To begin to identify possible trends in abundance and distribution we then grouped and sorted these records into three periods, each of three years: 2000–2002, 2003–2005 and 2006–2008, and mapped them by three-year period and province.

To date we have collected 98 records of a total 531 Red-billed Starlings observed in ROK between 2000 and 2008. Based on our shared experience, we are confident that these include the majority of records during this period, even though later records became harder to recover as the species became less noteworthy for observers. This suggests that the rate of increase in the species might be even greater than our data indicate. The total to date consists of 10 records comprised of 26 individuals in 2000–2002; 24 records comprised of 51 individuals in 2003–2005; and 64 records comprised of 454 individuals in 2006–2008 (Fig. 1). Between 2000 and 2002,

Figure 1. Changes in number of Red-billed Starlings observed in ROK (number of records a: 2000–2002, b: 2003–2005, c: 2006–2008). Observations in June and July were summed due to the prolonged existence of breeding populations.