

Amur Falcons *Falco amurensis* at Umrongso, Assam: Estimating roost size and monitoring migratory dates

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Abstract: The Amur Falcon *Falco amurensis* is a passage migrant through India. These migrating falcons, while passing through north-eastern India, congregate and roost at some select sites in Assam, Manipur, Meghalaya, Nagaland, and Mizoram, often exceeding a hundred thousand birds. The present study covered such a roost site in Umrongso, Dima Hasao District, Assam during the autumn of 2022. Four enumerators, including two trained assistants from the village, independently estimated the flock size on each day at dusk and the lowest estimate was taken as the minimum number of roosting falcons. The falcons were first seen on 04 October and by 13 December all birds had departed making the total migratory season of 70 days, of which 40 days had more than 1,000 falcons. The second and third week of November had the peak count with more than a hundred thousand birds roosting. The number of falcons increased every day till 07 November when the estimated number reached a staggering figure of more than two hundred thousand birds. This was the first such exercise on these falcons at Umrongso. With local assistance, it can be replicated at other roosting sites. Though illegal killing of Amur Falcons has been a serious problem in the past, we did not record any direct killing at this site.

Introduction

Amur Falcons [182, 183] breed in the basin of the Amur River in eastern Siberia, eastern Mongolia and north-eastern China, and migrate to eastern and southern Africa for their non-breeding season (Dixon et al. 2011; Orta et al. 2024). They regularly undertake trans-continental journeys across the Arabian Sea, which are, by far, the longest migration flights across a seascape amongst all birds of prey (Meyburg et al. 2017). They occur in large numbers in Assam and elsewhere in north-eastern India (hereinafter, NE India) chiefly during autumn in October–December, while reduced numbers pass through during the spring migration in March–April (Rasmussen & Anderton 2012; Orta et al. 2024). Almost its entire global population is believed to pass through NE India to their non-breeding destination in the southern Africa.

During migration, Amur Falcons pass through all the states in NE India as well as peninsular India and sporadically through northern parts of the country (Rasmussen & Anderton 2012; eBird 2024; Orta et al. 2024). However, they are known to aggregate and roost in several hundred thousand in certain sites in NE India (Choudhury et al. 2020), feeding largely on winged termites (Kaur et al. 2024). During their migration, the falcons rest and roost at some select sites with suitable vegetation and abundant food. In NE India, there are a few such sites in Nagaland, Manipur, Meghalaya, Mizoram, and Assam where they stop over in large numbers. A large number of hunters used to catch or kill the falcons in the past, but conservation interventions have largely contained this activity now (Dalvi et al. 2013; Mero & Mishra 2022).

In Assam, though Amur Falcons can be seen in most districts, there are some specific sites where they frequent to roost in very large numbers. The currently known mass roosts are in Habang (or Umrang) and Umru II (or Umrukhuti, hereinafter, Umru), both in West Karbi Anglong District and Umrongso (also spelt as Umrangsu) in Dima Hasao District (Choudhury et al. 2020). However, the falcons have now abandoned Habang due to

human disturbances. Conservation of such roost sites, where the falcon flocks refuel before they resume their journey, has a great significance for a flyway level conservation of this species.

In this study, our main objective was to monitor the arrival and departure dates of Amur Falcons in autumn and estimate their daily roosting population at a single site, Umrongso. We



182. A male Amur Falcon.



183. A female Amur Falcon.

also aimed to evaluate the practicality of this study-design to consider its scalability to other sites, and across multiple years, by deploying trained assistants from the village, with considerations to buffer the error margins. Such coordinated annual counts at carefully chosen migratory funnels are necessary for conservation planning, and to monitor the status of the population of a species that is vulnerable to large-scale illegal killing. Long-term monitoring would also help in understanding any changes in arrival or departure dates, if any, in response to climate change.

Study Area

Umrungso is located in the Dima Hasao (formerly known as North Cachar Hills) District of Assam (Fig. 1). The area is part of a plateau at an elevation of 640 m asl at Umrungso; the roost site is at 610 m. The topography of Umrungso is of rolling hills with a large reservoir formed by the dam on the Umrung River. The roost is on the south-eastern side of the reservoir near New Tumbung village (25.506°N, 92.712°E) (Fig. 2).

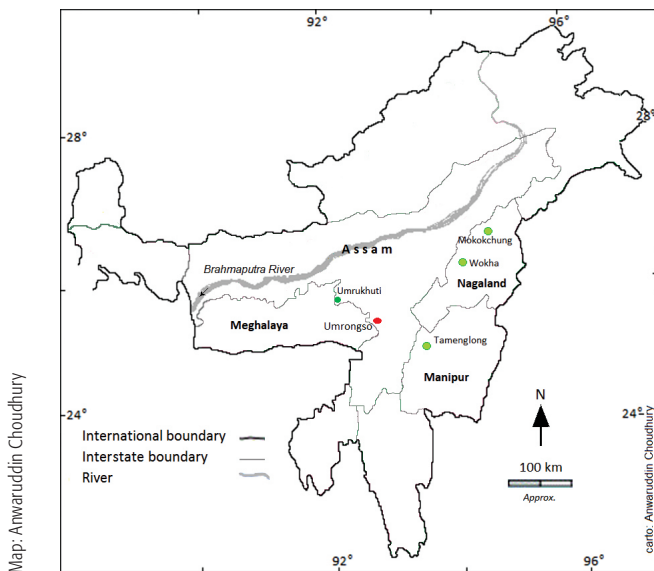


Fig. 1. Location of Umrungso in relation to other roosting sites in north-eastern India.

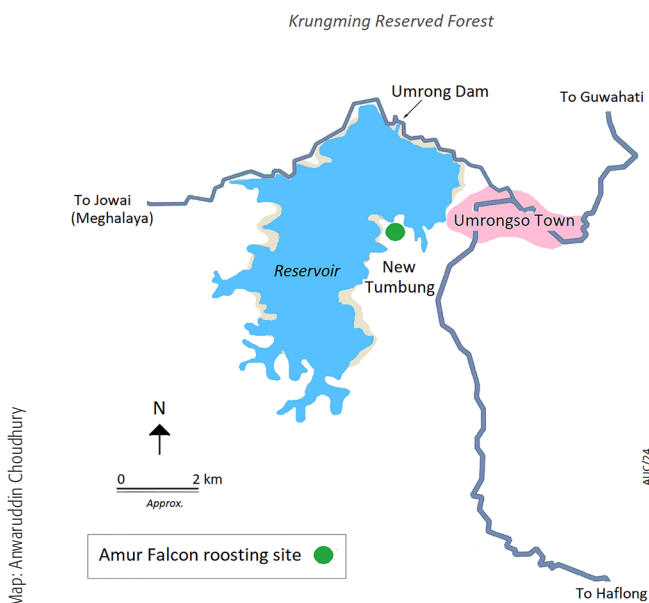


Fig. 2 Roost site at Umrungso. Map: Anwaruddin Choudhury

The natural vegetation of the area in general is tropical deciduous forests with bamboo brakes. There are also meadows with short grasses, cultivations and farms, hutments, and areas filled with sparse trees and shrubs. The banks of the reservoir near New Tumbung are planted with Khasi pine *Pinus kesiya* (old plantations) while there is plenty of oak *Quercus* sp. trees, young and old. Large parts of the grassy areas are submerged when the reservoir is at its full capacity [184].



184. Umrung Plateau with the roosting site. The grassy areas are submerged when the reservoir is full.

Methods

The study was done during October–December 2022 coinciding with the full migratory season in Umrungso; our knowledge from our previous studies elsewhere helped us select these months. AUC was present on 12 days while FT was present on all the days from 03 October to 06 December. We trained two assistants from the village during the same season to count falcon flocks, and they were also present on all the days with FT. An additional trained assistant also participated in the count during the peak 12 days. All of them had participated in counting and estimation as enumerators. The first three days of October, including a few days of estimation when there were less falcons, was a reconnaissance phase as the entire area was traversed by the team to identify vantage positions from where maximum number of birds could be visible. Each enumerator had a pair of binoculars while the authors also used cameras.

The flock size estimation was done by counting and estimating the roosting as well as in-flight birds, every day. The congregations were estimated when they arrived in large flocks and circled overhead for several minutes in late afternoon and evening to roost. The falcons did not all land together at a single area, but perched on trees in loose groups. All estimations were made in the evening, just before dusk, starting our observations at 1430 h and continuing till 1730 h [185]. Though observations were also carried out in the morning (0500–0930 h), we did not use those counts for estimating the congregation as the bulk of the roosting birds departed before or at dawn.

Flock size was estimated using a combination of counting and extrapolation. Counting of a part of the total mass of birds in view was done, and then extrapolated for the entire flock. Blocks of 100 or more, even a thousand are generally used for birds in flight or at roost. The first block is counted one by one, and the mental image of this first block is then used to estimate the number of similar blocks in the flock. For cross-checking our mental images, several photos were taken in the field and used to calibrate our estimates. After initial calibration, each enumerator conducted this process till mid-December. The daily compilation was done by the authors who were also enumerators. The lower



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185. Amur Falcons circling overhead before roosting at Umrongso.

range of daily estimates amongst all enumerators were accepted as the day's tally.

In the absence of another baseline for estimation, our counting methods, however stringent, is not devoid of bias. We also did not have any means to estimate this bias. Hence, for analysis and presentation, we have translated the daily total counts into count bands with multiples of tens as the extreme values. Hence the smaller count bands are tighter, while the larger bands are sparse; our working assumption being that counts of smaller flocks have smaller error margins and vice versa. We feel, this level of caution is justified as we envisage this method to be replicated across sites, with different assistants, who may have different biases, and might encounter different field conditions.

Results & Discussion

The falcons started arriving on 04 October and by 13 of December all the birds had gone (Table 1). Hence, the total stay of falcons at this site is about 70 days. From 15 October, for the next 40 days, there were at least 1,000 falcons roosting at the site. The number of falcons increased every day till 07 November when the estimated number was highest, exceeding two hundred thousand. The congregation was the maximum for a period of two weeks, starting from 04 November. Estimation of counts was relatively easier till 18 October but then became increasingly difficult as numbers swelled to tens of thousands. Though it is not possible to provide an absolute number of falcons that use this roosting site, mainly due to the arrival and departure of flocks, it is clear that the site hosts more than two hundred thousand birds.

It is possible to estimate the numbers of falcons arriving to roost, as they circle overhead, for some time, before they finally land for roosting in the evening. Birds did not arrive at the same time, but streamed in singly, in twos, threes, small to medium flocks, and at the end, a continuous stream. In fact, it appeared that some birds continued to arrive even after sunset, which we could not count, but we could hear. This build-up provided some opportunity to practice counting, every day, as numbers increased gradually. However, to count this number of birds reasonably accurately, in flight, over a shorter time, with worsening light conditions, was quite daunting. It is possible that counts might be so difficult to perform accurately

Table 1. Counts of Amur Falcons rounded to the nearest power of ten.

[†] Probably was present, but not seen by us

Dates	Counts
3 October 2024	0 [†]
4 October 2024	< 100
5–14 October 2024	100–1,000
15–17 October 2024	1,000–10,000
18 October–03 November 2024	10,000–1,00,000
04–17 November 2024	> 1,00,000
18–26 November 2024	10,000–1,00,000
27–30 November 2024	1,000–10,000
01–04 December 2024	100–1,000
05–12 December 2024	< 100
13–14 December 2024	0 [†]
15 December 2024	0

that they would have large errors. However, our counts were monotonically increasing till the peak count on 07 November, and then monotonically decreasing thereafter. Hence, this pattern, without wild fluctuations, provides some support that we are reasonably accurate in what we are claiming in Table 1. Fluctuations in numbers are to be expected, based on local weather conditions, but one would still expect a single major peak. Our response to take the least count may have meant we undercounted the flock size, but our method to classify the large counts as large bands provides some resilience against errors as each day's count is essentially acting as a replicate. However, it may be possible in the future to calibrate our counting methods with more trained observers, counting the same section on the same evening, and compare how their totals correspond.

The arrival and departure of Amur Falcons at Umrongso in 2022 was like the trend observed at Umru during 2017–2019 (Choudhury et al. 2020). At both sites, the first birds arrived around the first week of October and by the first fortnight of December, all the birds had gone. The peak counts of the congregation, which was over a hundred thousand, was during the second and third week of November. As the two sites are close to each other, it is likely that the entire population, before dispersing towards peninsular India, was using these two sites as their stop over.

The falcons usually roosted in oak *Quercus* sp. trees but when the numbers reached a hundred thousand some of the other trees including pine trees were utilized. However, in Umru, the birds used to roost in bamboo brakes and rarely in shrubs. Hence, their existence in Umrangso probably depends on continued presence of oak trees. Since the site is not part of any protected area or reserved forest, there is always a possibility that a few oak trees may get removed. While dispersing from their night roost in the morning, they perch in trees and high electric wires/power lines, and continue to do so throughout the day [186]. However, we are certain that they do not use these artificial structures for night roosting. An interesting observation was that of small gatherings of falcons on the ground at the edge of water in the morning [187], a behaviour not seen during three years of monitoring at Umru (Choudhury et al. 2020).



186. Amur Falcons foraging and resting during the day near Umrungso.



Both: Anwaruddin Choudhury

187. Some falcons were observed at the edge of the water of the reservoir in the morning.

During our study, there was no confirmed case of illegal killing in the area. However, a few dead birds were found, which could have been killed by predators as indicated by the condition of carcasses. It is possible that a few might have been killed or injured by slingshots elsewhere but not near the roost.

Illegal killing of Amur Falcons used to be an annual phenomenon in Umrungso until 2021. Every year local people had waited for the migratory season, when they got an opportunity to kill the falcons in hundreds for local consumption, and for sale in nearby markets. They had used both guns and slingshots. The last large-scale illegal killing took place in 2015 when the State Forest Department confiscated about a hundred birds that had been killed or trapped by hunters (AUC pers. obs.). The killing, however, was drastically reduced when AUC, in his official capacity as the Commissioner of Hill Areas, in association with the State Forest Department carried out awareness programmes in 2016. In the same year, the North Cachar Hills Autonomous Council also started celebrating 'Falcon Festival' for awareness raising and popularising the area as a tourist destination. Subsequently, a few forest staff were posted for the protection of the falcons during the migratory season. However, it was in 2022 that the enforcement was most effective. The Deputy Commissioner & District Magistrate, the local Member of the Autonomous Council, the Divisional Forest Officer, the Executive Magistrate and the village headman actively participated in the

awareness programmes.

A large number of tourists, mostly local, gather in the evening to see the arrival of roosting birds. The number of visitors is likely to increase in the future, which might disturb the falcons, unless regulated. Tourists make a lot of noise, and many go in motorcycles through the roosting site, which disturbs the birds.

Conclusion

This study has provided vital information on migration timing and approximate numbers of Amur Falcons at Umrungso. Similar systematic observation and estimation should be done for other large roost sites in NE India. Although the methods have limitations, it still provides a decent estimate of the maximum population at the site and the key periods of peak activity and is replicable across multiple sites with some support from local NGOs and forest departments.

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