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A note on the temporal and spatial distribution of Asian Woollyneck in Assam, India

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Abstract Asian Woollyneck *Ciconia episcopus* is listed as a globally Vulnerable bird species and there is very little detailed information about its ecology, including basic aspects such as distribution and seasonal movements. In this paper, we assembled primary and secondary information on the species focusing on the Indian north-eastern state of Assam and provide a preliminary understanding of its movement, distribution and breeding in Assam. We collated our individual field observations from 2010 to 2020 in five districts, invited responses from experienced bird-watchers using a standard questionnaire, and downloaded available data provided by volunteers on online portals. Asian Woollynecks were seen in Assam largely in the months of November to April with comparatively fewer sightings in other months. Most observations were in Kaziranga National Park which is one of the most visited national parks by tourists and bird-watchers. No confirmed breeding record was available of the species in Assam. Observed flock sizes were mostly 1 – 2 birds, with a much higher average flock size in Sonitpur district. The collated data suggests that the Asian Woollyneck is a seasonal non-breeding migrant to Assam occurring largely during the winter months..

Keywords Asian Woollyneck, Assam, seasonal non-breeding migrant.

Introduction

Assam, a state in northeastern India, is a land of plains and river valleys with three principal physical regions: Brahmaputra Valley in the north, Barak Valley in the south, and the hill systems of the south-central region. The state is one of the hotspots for avian biodiversity in the country with 696 species recorded (Clements *et al.* 2019). Several wading birds are supported by this unique co-occurrence of biomes, including the Asian Woollyneck *Ciconia episcopus* (Chakdar *et al.* 2019; Grimmett *et al.* 1999; Ali and Ripley 1983).

The species is widely distributed in south Asia with an extensive elevational range from the low plains to 1,800 mamsl in the Himalayas (Sundar 2006; Ghale and Karmacharya 2018; Gula *et al.* 2020). In Assam, there have not been any focused exploration of the Asian Woollynecks' ecology, habits and requirements despite its status as a globally “Vulnerable” species (BirdLife International 2020). In this paper, we evaluate the occurrence of the Asian Woollyneck in Assam using a combination of our personal observations, interviewing bird-watchers, and analysing the information uploaded by volunteer bird-watchers on the online portal eBird.org. Specifically, we seek to understand the status of the species in Assam in terms of its distribution and occurrence throughout the year. We also use our personal

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Table 1. Personal observations of Asian Woollynecks by authors between 2010 and 2020 in Assam, India.

Location*	District	Month & Year	Count	Habitat
Kaziranga NP	Golaghat	1 February 2010	1	Wetland
Roumari beel, Kaziranga NP	Golaghat	2 February 2010	1	Wetland
Pobitora WLS	Marigaon	1 February 2016	1	Wetland
Kaziranga outskirts, Western side	Nagaon	6 May 2016	3	Agriculture
Kokilamukh beel	Jorhat	18 February 2017	1	Wetland
Pobitora WLS	Marigaon	22 January 2017	4	Wetland
Bagori range, Kaziranga NP	Nagaon	17 February 2017	1	Wetland
Bagori range, Kaziranga NP	Nagaon	17 February 2017	1	Wetland
Bagori range, Kaziranga NP	Nagaon	19 February 2017	1	Wetland
Nahrubasti, Kaziranga NP	Sonitpur	22 February 2017	1	Wetland
Bagori range, Kaziranga NP	Nagaon	16 January 2018	4	Wetland
Gaikhuti beel, Kaziranga NP	Sonitpur	19 February 2019	13	Wetland
Central range, Kaziranga NP	Sonitpur	18 February 2019	1	River
Western range, Kaziranga NP	Sonitpur	19 February 2019	3	Wetland
Bagori range, Kaziranga NP	Nagaon	12 February 2020	2	Wetland
Bagori range, Kaziranga NP	Nagaon	10 February 2020	1	Wetland
Bagori range, Kaziranga NP	Nagaon	11 February 2020	1	Wetland

observations to document the average flock size of the species, and carefully review all of the available information to understand the breeding status of the species in Assam.

Study area

Our collective field work covered the five districts of Golaghat, Jorhat, Morigaon, Nagaon and Sonitpur. All these districts lie on the flood plain of the river Brahmaputra. Sonitpur shares its boundaries with Arunachal Pradesh in the north, and Golaghat and Jorhat are bordered by Nagaland in the south. The climate of the area is humid with an annual rainfall of approximately 2,135 mm with peak rainfall from June to September (Guhathakurta *et al.* 2020). Based on the trend in rainfall, four seasons are recognized in the northeastern state of Assam namely; pre-monsoon (March-May), monsoon or rainy season (June-September), post-monsoon (October-November) and winter (December-February; Deka *et al.* 2015). The mean temperature recorded in the state during monsoon is 28.8⁰ C, with a minimum of 16.9⁰ C during the winter (Tamuly *et al.* 2019). Our personal field surveys were relatively higher in protected areas that were dominated by woodlands and wetlands. Additional habitats covered were wetlands, grasslands and forests with equal efforts towards agricultural fields that were located in and around the unprotected areas.

Methods

To assess the presence and distribution of Asian Woollyneck in Assam we used three different sources of information. The first was our personal observations that we maintained during various field work between 2010 and 2020 when we noted all observations of Asian Woollynecks (Table 1). These observations were not systematic in the sense of timing of visits, the kinds of habitats covered, and field effort was essentially *ad-hoc*. During each observation, we noted the location, the habitat used by the birds, and the number of Asian Woollynecks seen.

The second method we employed was a structured questionnaire that was sent to bird-watchers who frequently bird-watched in their respective locations. The main intent of the questionnaire was to record the locations and months when Asian Woollynecks were sighted in Assam. We sent out questionnaires to fifteen people and received six responses, which are collated in Table 2.

Lastly, the third method employed was the analysis of records of Asian Woollynecks uploaded by volunteer bird-watchers on the online portal eBird.org. For this paper we downloaded all records for the species between 2010 and 2020. We computed two metrics from this data. The first was the frequency of sightings, or the proportion of checklists that reported Asian Woollynecks. The second was average abundance, or the average number of birds observed in the checklists



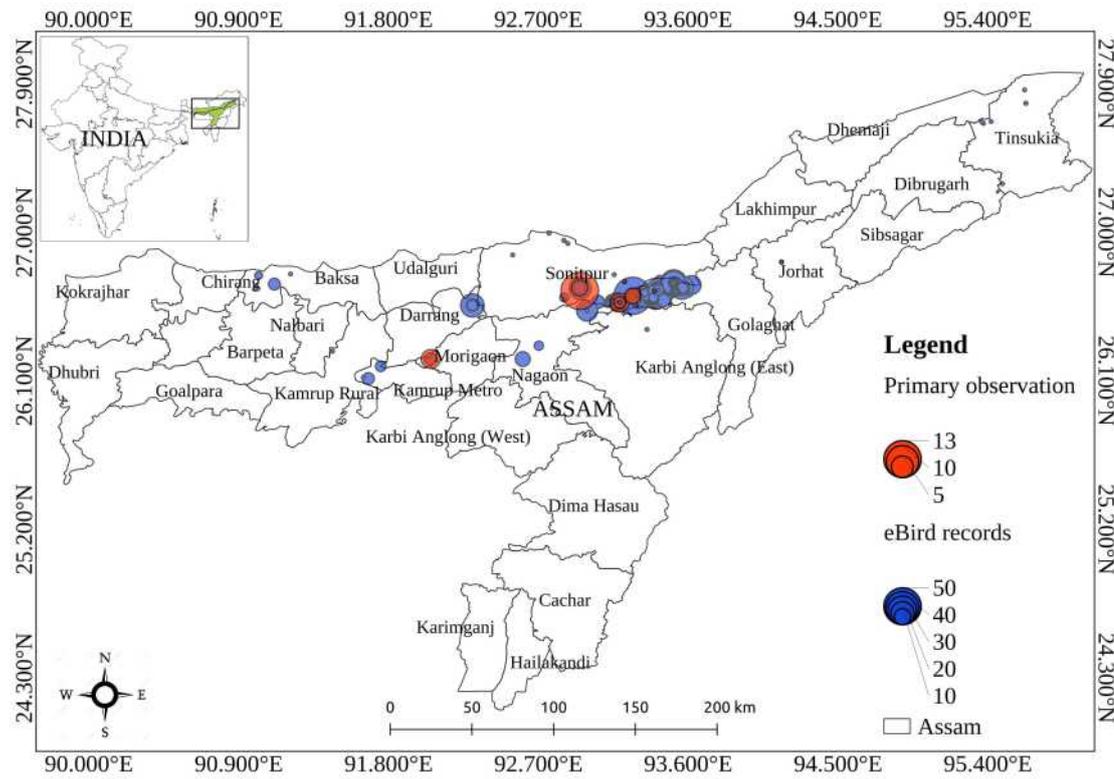


Figure 1. Map showing distribution and size of flocks of Asian Woollyneck in Brahmaputra valley of Assam. Primary observations are personal sightings of the authors, and eBird sightings were uploaded by volunteer birdwatchers to the online portal.

that reported Asian Woollynecks. The total number of checklists from Assam between 2010 and 2020 which were used for analysis varied for each month and season. Winter and pre-monsoon had the highest effort with 9015 and 7569 checklists respectively, followed by 3130 during the post-monsoon season. Monsoon had the least number of checklists with only 2021 total checklists. However, the checklists in which the Asian Woollynecks were recorded in Assam during winter, pre-monsoon, post-monsoon and monsoon of the mentioned period were 321, 319, 152 and 7 respectively.

Results

We personally recorded Asian Woollynecks 17 times (Table 1) and the majority of sightings were in Kaziranga National Park, which lies in Nagaon, Golaghat and Sonitpur districts, followed by

Pobitora Wildlife Sanctuary in the Morigaon district of Assam (Figure 1, 2). The response provided by the birdwatchers through structured questionnaires also provided Asian Woollyneck records largely from protected areas including Manas National Park, Orang National Park, Nameri National Park, and Laokhowa-Burachapori Wild Life Sanctuary. Few records were also reported from the unprotected areas of Maguri-Motapung beel, Deobali jalah, Puthimari beel and agricultural fields in Simla, Baksa district (Table 2). Records of Asian Woollynecks on eBird were along the Brahmaputra river basin, starting from Sadia in the Tinsukia district to Manas National Park (Figure 1). Species presence was also recorded at the river island of Majuli, around Bhamaraguri and within many other unprotected areas. However, neither the birdwatchers nor the

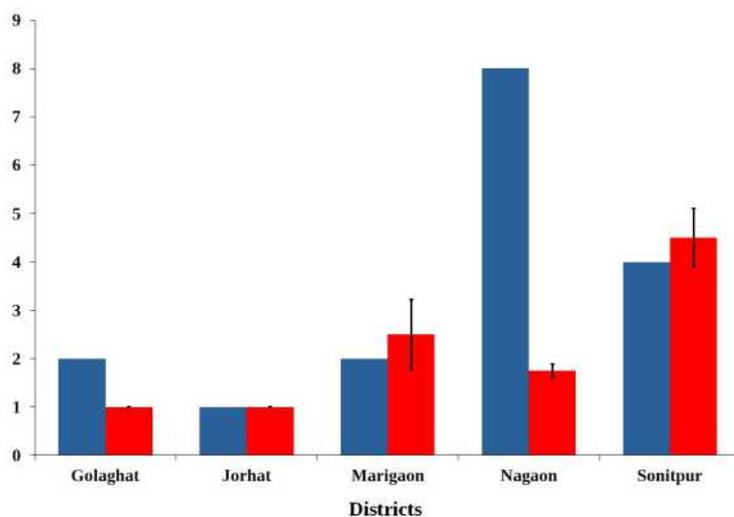


Figure 2. Average flock size of Asian Woollynecks observed in Assam between 2010 and 2020. Seventeen sightings made by the authors are summarized in the bar graph. The blue bars represent the number of observations and the red bars represent the average flock size observed in the respective districts.



Table 2. Questions that were sent to birdwatchers, along with a summary of their responses.

Questions	Cumulative responses
Probable places where you have observed Asian Woollyneck in Assam?	Kaziranga National Park, Pobitora Wildlife sanctuary, Laokhowa Burachapori Wildlife sanctuary, Manas National Park, Orang National Park, Nameri National Park, Maguri Beel, Deobali Jalah, Puthimari, Simla-Baksa district.
Are they found in these locations throughout the year?	No
If not, when are they usually seen? (Answer in range of months)	Very frequent-November to February, Less frequent-March to October
Is hunting/trapping common in these habitats?	No/Not inside the national park or protected areas
Do they nest in any of these locations?	Never observed

data from eBird mentioned the presence of Asian Woollyneck from the Barak Valley which consists of numerous wetlands and water bodies.

Our personal encounters with Asian Woollynecks was mostly in winter between January and February (94% of 17 sightings). Only one observation of a flock of three Asian Woollynecks was observed on 6 May 2015 from the Kaziranga Outskirts-Western side, Nagaon district. Birdwatchers' sightings of Asian Woollyneck were also largely between November to February including the post-monsoon to winter and very few sightings during the monsoon. Similarly, the eBird.org data also suggested the temporal distribution of the species to be minimum during monsoon. However, the frequency of observation of Asian Woollyneck according to the data from eBird.org was relatively higher during the post-monsoon and pre-monsoon compared to winter (Figure 3).

Most of our personal observations of the species were within wetland habitat. A total of 40 individuals were encountered with average count of 2.35 ± 2.96 SE (flock size 1 – 13; Figure 2). We noticed a flock of three birds roosting in an agricultural field, which is also the only evidence of Asian Woollynecks using agricultural areas during our survey. Birdwatchers also observed the species mostly within wetland habitat (90% of sightings) with no confirmed breeding records. An observation made on 22 April 2015 reported on eBird.org recorded the highest flock size of 50 individuals at Kaziranga NP-Western Range, Nagaon district. No additional details of habitat

use or behavior was provided for this observation. Our personal surveys recorded higher observation of Asian Wollynecks from the protected areas as compared to unprotected areas with a ratio of 7:1. Similarly, the eBird.org data also suggested the records to be higher from protected areas with a ratio of 12:1.

Discussion

We provide a preliminary overview of Asian Woollyneck distribution, seasonality and some aspects of ecology of the species. All of the records we obtained suggest that this species is not very widely distributed in Assam, and also that it is very strongly seasonal. It is not clear why the species is so sparsely distributed. On seasonality, it is possible that the annual flooding which the region experiences during and immediately after the monsoon, dissuades Asian Woollynecks and potentially other wading resident birds from remaining in Assam. We also failed to locate any breeding records. Typically, the breeding season, in north India, commences in May with most nests built during the rainy season (Ishtiaq *et al.* 2004). The very low number of observations of Asian Woollynecks in Assam during the rainy season suggests that conditions are unsuitable for foraging which in turn would make it difficult for storks to provision chicks. Asian Woollynecks have been observed to be seasonal in other areas of India as well with number of sightings dropping greatly during the summer because of drying up of wetlands and the general landscape (Kittur and Sundar 2020; Roshnath and Greeshma 2020). Assam appears to be the only location where



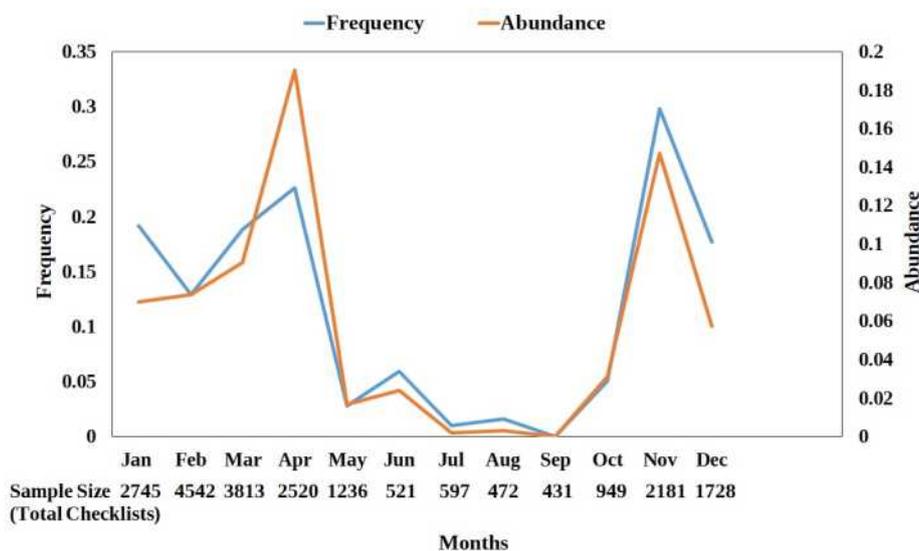


Figure 3. Monthly frequency and abundance of Asian Woollynecks in Assam as reported by volunteer birdwatchers on the online portal eBird.org from 2010 to 2020.

excessive flooding during the rainy season forces Asian Woollynecks to move out of the state.

Unlike in other locations like Myanmar (Win *et al.* 2020), Nepal (Katuwal *et al.* 2020) and other regions of India (Sundar 2006; Kittur and Sundar 2020), we found very little evidence that Asian Woollynecks use agricultural areas regularly for foraging. Partly, this finding could be due to our focus on protected forested and swamps, and partly because much of the information on Assam's birds on online portals is provided by tourists who also focus on protected forests.

As with other studies on Asian Woollynecks, flock sizes were mostly small with flocks of more than 10 birds being very rare (see Table 1). Even on eBird, only one large flock of 50 individual storks was reported. This is identical to observations in other regions of India (Kittur and Sundar 2020) and Nepal (Katuwal *et al.* 2020).

Despite being a small study in its scope, we have attempted to put together information from various sources. Our findings showcase the settings in Assam to be unique for Asian Woollynecks. A large proportion of our data were volunteer records, and our own field records were collected in an *ad-hoc* manner. It would therefore be useful to conduct specific studies on Asian Woollynecks in Assam to understand whether they truly avoid agricultural areas, to confirm their seasonal occurrence in the state, and to decipher the reasons for their not breeding in Assam.

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