**Project Update: June 2019**

## Introduction

Giant nuthatch is globally endangered and restricted to submontane forests in southern China (primarily Yunnan), eastern Myanmar (principally Shan State) and northern Thailand (BirdLifeInternational, 2001). Its population is small (<3800 individuals), but estimates are currently very imprecise (Birdlife International 2016). The population is inferred to be declining and severely fragmented due to habitat loss from logging, fuelwood collection, shifting cultivation and fire (BirdLifeInternational, 2001). Although eastern Myanmar contains ~30% of its global range, recent data regarding its distribution and population status are lacking. Historical data (before 1950) from Myanmar indicated it was found in parts of Shan State, Kayah State and Moegok Hills (BirdLifeInternational, 2001), but recent (<5 years) sightings of giant nuthatch are only from unpublished records from local bird guides(Ko Pan Kalaw, Ko Oo Kalaw and Ko Phoe Khwar) due to poor accessibility to the few available protected areas and occasional insurgent activity. For species such as this without reliable abundance estimates from primary habitats, global population estimates are imprecise and potentially misleadingly optimistic. Overall, the ecology and habitat requirements of the giant nuthatch are still largely unknown making it extremely difficult to estimate the amount of remaining habitat and hence the size of the remaining population in Myanmar and elsewhere. So, we intend to assess the distribution of the giant nuthatch in Myanmar mainly in Shan state. We also expect that our project will contribute baseline data about the giant nuthatch which will help estimate the size of the remaining population in Myanmar and prioritize areas for conservation.

As the first project update reported in March, 2019, we had conducted initial surveys to find this nuthatch in three study sites: Kalaw, Mt Myim Ma Hti and Mt Ashae Myim Anauk Myim. After finding giant nuthatch on 24 December 2018, we continued to conduct field surveys: point count sampling, vegetative sampling and observations on foraging behaviour. To fulfill the objectives of this project, we completed all surveys to assess the probability of detection and habitat associations, estimate abundance and density, and to understand the foraging behaviour.

## Point Count Sampling

Point count sampling was started on 21 January 2019 and continued until the end of March, 2019. We established 46 sample locations in the forest and of those, we sampled 43 locations five times and three locations between two and three times. Adaptive cluster sampling method was used, and four adjacent points were surveyed around primary starting points—each survey point was 300 m apart in cardinal directions where possible. When adjacent points could not be established due to steep slopes, impenetrable undergrowth or unsuitable non-forest habitat like tea plantations, plots were set at further distances in the same direction.

We conducted point-count surveys by using playback of vocalisations of giant nuthatch to increase the probability of detection(Bibby et al., 2000). Recordings of calls and songs were obtained from the Xeno-canto database (www.xeno-canto.org). During the surveys, the nuthatch contact call was played for 30 s, followed by 5 min of observation. If there was no response in the first round, the bird's territorial song was

played instead, for 30 s, followed by observations for a further 5 min (Techachoochert, 2018). Each session therefore lasted about 11 min. The surveys were conducted from sunrise until noon. The presence of the bird was recorded by sighting and hearing the vocalisations. When the bird was detected, we measured the distance to bird and recorded the direction to the bird, and location of the bird within the tree or other substrate.

There were detections at 22 points and no detections at 24 points. At the points with detections there was a total of 63 detections and no more than two birds were ever detected at a point on any single sampling occasion. At nine of the points, two birds were detected during a single count and at the other 13 locations there were only single detections.

Regarding the preliminary data analysis, the total abundance for the sampling area (46 sampling points) was estimated to be 35 (24-51, 95% CI) with the mean abundance per site of 0.767 giant nuthatches with a detection probability of 0.680 (0.467 - 0.837, 95%CI) for the first visit and 0.41 (0.307 - 0.518 95%CI) for the remaining four visits. Since each sampling point covered 0.0707 $km^2$ (150 m radius), 46 sampling points have the total survey area of 3.25 $km^2$. The estimated density was therefore 10.85 birds/ $km^2$. Our result of 0.767 mean abundance per point appeared to be somewhat higher than the 0.55 mean abundance reported by (Techachoochert, 2018) and our mean detection probability (0.463 ± 0.063) appeared to be higher than Techachoochert et al. (0.287 ± 0.145). Our mean density estimate was also appeared to be higher (1.96 birds/ $km^2$).

**Micro-site selection and Vegetative sampling**

Micro-site variables and vegetation characteristics were sampled at each point count location (also marked with a GPS). At the centre of each location, one circular plot (12.6 m in radius, 0.05 ha) were established to sample the elevation, slope, aspect and plant community. Canopy openness was estimated with an ocular tube (Bunnell and Vales, 1990). All trees (>10 cm DBH) within the sample plots were assessed including number of stems, tree species and DBH (diameter at breast height) (Sutherland, 2006).
Most of points were dominated by Fagaceae species, and a few pines trees. Our data suggests that the probability of the presence of giant nuthatch is higher in the areas with large Fagaceae trees. Our data suggests that the bird is not present in the western part of Mt Ashae Myim Anauk Myim in Ywar Ngan Township where there are no pine trees although it has mostly similar elevation range and other large broadleaf trees as in the eastern part.

Photo-1: Local field assistant Ko Lwan Maung, is from Palaung ethnic minority measuring the dbh (diameter at breast height) in vegetative sample plot. He can identify many birds by sight and by call, and is also familiar with tree species because he has lived in this forest as a cowherd since he was child.

**Foraging behaviour**

Samplings on foraging were conducted in four different locations to encompass the whole study area and to observe on the different vegetative areas. We tried to find the bird firstly without playing the call, and we tried to observe and follow the bird as long as we can. To minimise the effect of observer disturbance, no data were recorded for the first 10 seconds after a bird was sighted(Adams and Morrison, 1993). We observed the tree species and its GBH that the giant nuthatch is feeding on along with the 2-3 trees surrounding the host trees to understand the preferred tree species of the bird. For foraging data, we collected substrate and foraging mode used by the bird including the duration that the bird spent on each substrate for each mode. Substrate categories were trunk, large branch (>15 cm diameter), medium branch (5-15 cm), small branch (1-5 cm), twig (<1 cm), down log, down branch and ground. Following Adams and Morrison, 1993; we defined foraging as glean, to remove stationary prey form surface of substrate while perched; probe, to insert bill into bark crevices or depressions in substrates in search of prey (action usually created little or no audible sound); peck, to strike substrate forcefully with bill to obtain prey beneath the surface (usually created clearly audible sound); and flake, to chick away loose particles of substrate surface. The time spent travelling along the bark surface ("searching"), flying and remaining stationary was also recorded.

We have found that giant nuthatch mostly used the trunks and large branches and avoided the twigs for feeding. Giant nuthatch also preferred the trunks and branches of Fagaceae trees with *Ficus* species.

Foraging data will be computed as the percent of each observation period spent on a particular plant species, substrate, and foraging activity. Only the first 10-15 second series for each bird will be used in these analyses to eliminate the bias of easily observed or long-lasting behaviours(Adams and Morrison, 1993). We will also try to understand the relationship between proportional use of tree species by the bird and proportional tree abundance.

Photo-2: Giant nuthatch is feeding on hairy caterpillar in left-side picture, on other unidentified insect larvae in the middle and on a small aphid in the right.

**Breeding history**

A nest was found while following the bird for foraging observation on 5th April 2019. Adult was carrying the caterpillars and walking along the trunk. The nest tree was *Catanopsis indica* of 70 cm DBH with 12.8 m in height. The nest was situated at 3 m above the ground. The cavity was in a natural cavity with 7.6 cm width and 30 cm depth. Two eggs were found on 7th April 2019 (at least one additional egg was present but could not be observed due to the nature of the cavity) and eggs probably hatched on 9th April. Three fledglings left the nest on 6th May 2019 and the nestling period took about 27 days. Our finding about fledged age is about 27 days similar to the findings of (Charonthong and Sritasuwan, 2009) (3 young fledged at 25 days).

**Outreach and capacity building capacities**

*Educative talks* - A series of educative talks were conducted in cooperation with Pindaya Township Forest Department in four villages around Zaw Gyi reserved forest of Mt Ashae Myim Anauk Myim. Forest law, establishment of community forests and sustainable use of forest products were presented and discussed by the forest officers and rangers from the forest department. Biodiversity conservation and their importance was discussed by our survey team along with a presentation about our project. After the presentations, we conducted group discussions about four topics: agricultural expansion especially tea plantations, unsustainable tree cutting for fuelwood, non-timber forest products harvesting and illegal logging. All local people were encouraged to participate in the discussion. In group discussion, we mainly focused on the main causes, how to solve them without undermining the rights of indigenous rights and who is responsible for this. Each local participant from each group presented their findings and results of group discussion. We learned about issues related to their livelihoods and their willingness to participate in forest conservation around the AMAM site. A common issue is that most of their villages lack electricity and therefor they use a large, but unquantified, amount of fuelwood for boiling tea leaves for production rather than for cooking. Furthermore, most young people have minimal schooling in primary education and are also lacking knowledge and skills for their daily needs except traditional tea

farming. So, they have would like to make request government and other organisations for development to give the training for improving their livelihoods and raising alternative income without harvesting orchids in the natural forests. They had indicated that having a community forest might be a useful way to secure their rights for using forest resources and for engaging conservation of their forests by themselves.

Photo-3: Forest rangers presenting about forest law appliance in the left photo, local people are presenting results from their group discussion in the middle and my research assistant is presenting about biodiversity conservation (right).

*Capacity building* - A forestry graduate (Mr La Min Ko Ko) from the University of Forestry and Environmental Science, Myanmar worked as an intern in my project and was my primary field assistant. He was a valuable assistant and was able to independently survey for giant nuthatch, significantly increasing the efficiency of the surveys.

My primary field and my local field assistants from each village around the study area learned survey design, bird and vegetation surveys as well as field logistics and were introduced to and became familiar with key people in the Myanmar forest department, local government authorities and civil society organisations. Our local field assistants now have the capacity to serve as guides for local bird watchers.

My assistant and I were able to learn some additional bird identifications from our bird guides, including some calls.

*Distribution of awareness-raising T-shirts* – A total of 100 t-shirts were freely distributed to staff of the forestry department at range officer level and higher, village administrators, local field assistants, people who worked on biodiversity from NGOs and local bird guides. A small postcard with QR codes (Photo-5) to visit the project webpage and watch the awareness-raising video on YouTube was also included with each t-shirt.

Photo-4: Young foresters wearing T-shirts in the left photo, back design of T-shirt in the middle and a family of forest officer wearing T-shirts (right).

*Awareness-raising video*- A short video clip with a brief explanation about the ecology and the rediscovery of giant nuthatch and our project activities was created and uploaded on Facebook and YouTube. This video was created by using photographs and movie clips that were taken during the fieldwork and from the local bird watchers who visited our study site after we rediscovered the bird. The video is narrated by a forest range officer (Mr Khant Min Maw) in the Myanmar language and subtitled in English.


Photo-5: Postcard with QR codes that was distributed with T-shirts. The left QR code links to a video on YouTube (https://www.youtube.com/watch?v=-RUgugiRudI&t=55s) and the right QR code can generate the link of the project webpage on the Rufford foundation website. (https://www.rufford.org/projects/thura_soe_min_htike)

**Future work**

Analysis of vegetation data will be conducted during May-June and foraging data will be analysed during June-July. Post-image classification is expected to be finished by the end of August.

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