

## **Project Update: February 2020**

### **Introduction**

In India, semi-arid grasslands and dry thorn scrub remain some of the most neglected habitats. The ever-increasing population and developmental pressures have left the once contiguous and widespread grassland habitats in fragments and sometimes even referred to as 'fallow' or 'wastelands' in revenue documents. These claims tend to overlook the immense faunal diversity of the region. Apart from the diversity of organisms they support, grasslands also perform crucial functions of sequestering carbon from the environment. These ecosystems once spread widely across most of Indian subcontinent and served as a lifeline to communities of pastoralists and herders that depended on them for fodder and forage. Despite the ecological importance and the ever-growing pressures on these habitats, not much has been achieved towards long term monitoring to study the impacts of climate change on these habitats.

Hence, the present study uses birds and bats within a passive acoustic monitoring paradigm, aiming to quantify community dynamics and change which can serve as ecological indicators of changes in the environment.

### **Objectives**

The objectives for the first winter season of our study were:

1. Collecting passive acoustic data from Nahargarh Biological Park and Tal Chhapar Wildlife Sanctuary to study the acoustic community structure of scrubland and grassland bats and birds across seasons.
2. Scan local areas for bat roosts and interact with local communities and the forest department staff to familiarise them with our project.
3. Search for and locate additional, potential sites for one of the target bird species, white-browed bushchat.

### **Data Collection**

#### Passive acoustic monitoring:

The study area in Nahargarh Biological Park spread over an area of 720 ha, has vegetation of dry scrub forest type, whereas the Tal Chhapar Sanctuary which encompasses an area of 719 ha is a dry grassland habitat. The acoustic sampling was targeted towards recording the vocalisations of the bird and bat communities in the area. We conducted passive acoustic recording at Nahargarh Biological Park in the second week of November for 4 days. While a 9-day sampling effort was put into recording at Tal Chhapar.

#### Recording at Nahargarh:

Based on information acquired from local bird watchers, we narrowed down our area of sampling to more intact thorn forest patches, where there have been regular sightings of the white-naped tit. We recorded at three sites but were unable to detect the bird. Local information suggests that the bird is rare at this site, particularly after the construction of the biological park in the premise of the sanctuary. The high tourist activity, as well as conversion of intact thorn forest patches have left very little habitat for the white-naped tit and other thorn forest

inhabitants like the marshall's iora and the white-bellied minivet, which were also absent from our recordings. Furthermore, owing to security reasons and presence of mammals like the leopard, we were unable to explore further sites for the white-naped tit. We are hoping to survey additional sites during our next field season, as the birds will be breeding and hopefully more vocal.



Left: Recorder placed at one of the thorn forests patches where the white-naped tit is regularly observed. Right: The famed waterbody inside nahargarh biological park. This is one of the most reliable spots for the bird.



A patch of thorn scrub.



Recording at Tal Chhapar- Our sampling period at Tal Chhapar WLS spanned a total of 9 days over the field session. Our recorders were placed at four locations inside the sanctuary as well as two locations outside (*Gaushala*). While the area inside the sanctuary is primarily grassland, with isolated patches of trees, the area outside is a mosaic of grassland and thorn vegetation, with short trees like *Prosopis* and *Acacia*.

Inside the sanctuary, we placed our recorders close to the three water bodies within the area, and one on the far north side of the sanctuary. This had two major advantages: one, this minimises the risk of the equipment being lost; and two, we were able to maximise our bird species detection by recording sounds from both the grassland as well as the water body and patch of trees surrounding it. The fourth recorder kept at the north boundary also had two advantages: first, it ensured an even spread of each of our recorders relative to each other; and second, this patch is also the most reliable known spot for the white-browed bushchat. We recorded for 3 hours each day, at two sites for 9 days. Based on our initial census, we have detected 26 species of birds in our passive acoustic recordings, although much data remains to be analysed. However, we did not see or hear a single white-browed bushchat during our field season.



Ultrasound recording microphone at a water hole site for recording bats

#### Bat sampling:

Night-time passive recording was done to acquire data on bat activity in thorn scrub habitats of Nahargarh Biological Park for two sampling days and for eight days at the grassland habitat in Tal Chhapar Sanctuary. The SM4 bat recorders were deployed in a forest clearing, which are ideal sites for recording bats foraging in

forest, edge as well as open habitats. The recorders were scheduled to record from 6 pm to 7 am. Trigger thresholds were used to avoid triggered recordings by insects and other high frequency noises.

#### Bat roost scouting:

Additional efforts were put into searching for bat roosts at Jaipur and Tal Chhapar. In Jaipur, archaeological sites, temples and old buildings were explored for finding bat roosts. We explored Amer fort, Jantar Mantar and old buildings adjoining forts in Jaipur. Many of the previously known sites where bats were known to roost were found to be empty owing to renovation works or movement of bat colonies due to natural circumstances.

In Tal Chhapar village two distinct lesser mouse-tailed bat colonies were observed in old houses and abandoned structures. The echolocation calls of bats were obtained from the roost site.

The white-browed bushchat occurs in very low numbers at this site and has a patchy distribution, making it difficult to spot. However, based on information from literature and past records, we surveyed areas in Tal Chhapar and outside, in order to look for the bird but with no success. It is possible the species is only seasonally present within the sanctuary or for a limited time. To locate additional sites, we also visited known locations for the species at Jorbeer Conservation Reserve and Diyatra in nearby Bikaner district where white-browed bush chats have been noted in good numbers. However, we were unable to find the species during our short visits in these areas as well. Our hope is to continue exploring these areas by hiring local guides familiar with the bushchat, and we will continue our efforts in the next season. We have reached out to the ornithologists who had previously studied the bird and are hopeful of finding it and recording its song, which will aid in acoustic monitoring efforts.

Our recordings at the *Gaushala* area outside the sanctuary are important because it is one of the most reliable spots in the country to observe the Indian spotted creeper *Salpornis spilonota*, a bird with very patchy distribution. We spotted and recorded the bird during our visit, and are hopeful that this species, owing to its call, will also be a good model to study using passive acoustic monitoring. During the breeding season, it will be a particular focus of our efforts.



Left: One of the recorders at the grassland adjacent to the water body. Right: A Zoom H6 recorder with Sennheiser omnidirectional microphone, collecting bird song

data.



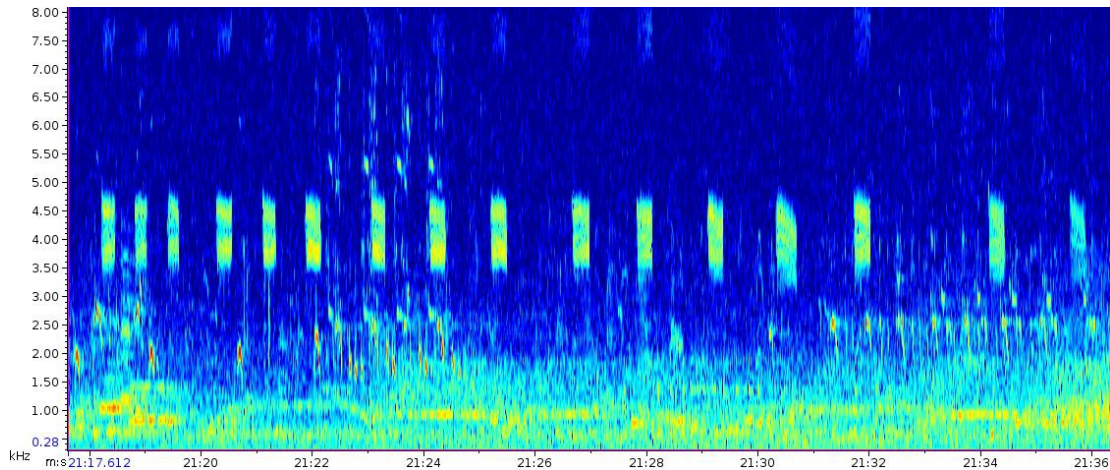
Left: One of the water bodies at Tal Chhapar Wildlife Sanctuary. Right: Jorbeer conservation reserve in Bikaner is one of the reliable spots for the white-browed bushchat, and there are previous breeding records from here.



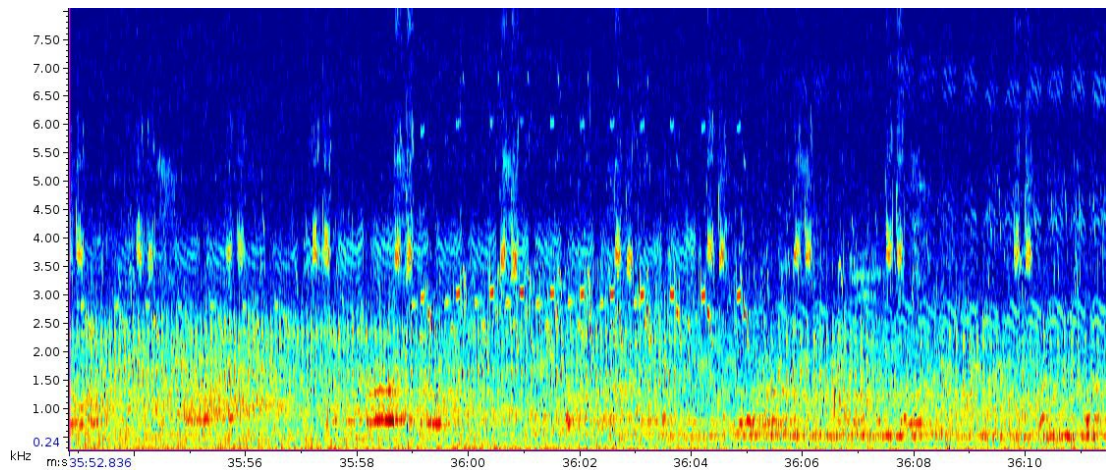
A waterbody in Diyatra, where Dr. Asad Rahmani's survey, had reported white-browed bushchat in the 1990s.



Below are some samples from our recordings, representing the bird community of semiarid habitats:



Great Gray Shrike with a simultaneously vocalising Gray Francolin detected in one of our recordings.

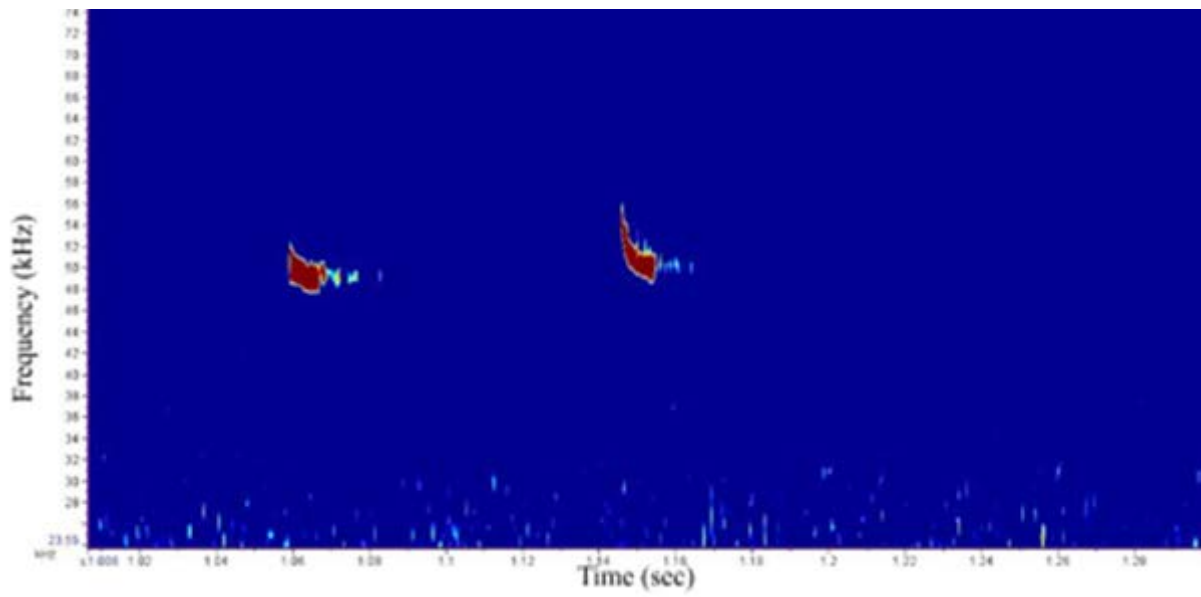


Gray Francolin, Large Gray Babbler, Gray Shrike, and a Plain Prinia simultaneously vocalising.

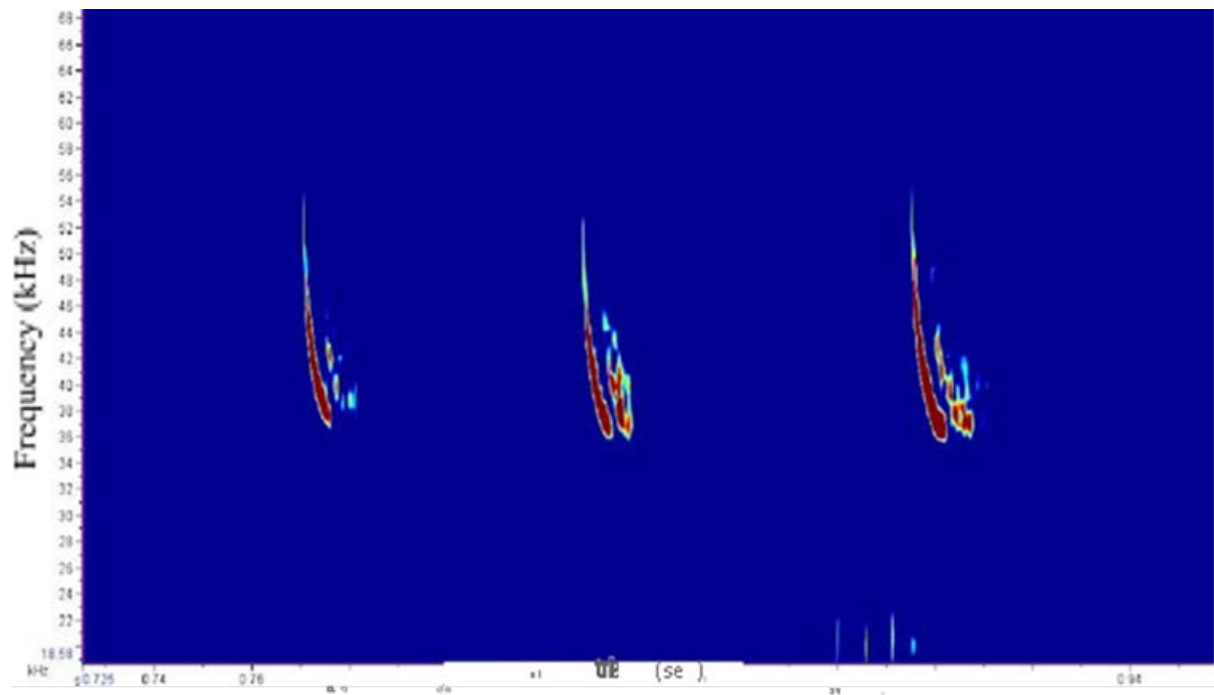
#### Bat sampling:

Based on data analysis so far, we have recorded four bat species in Nahargarh Biological Park: *Pipistrellus tenuis*, *Pipistrellus ceylonicus* / *Scotophilus kuhlii*, *Tadarida aegyptiaca*, and *Rhinolophus lepidus*.

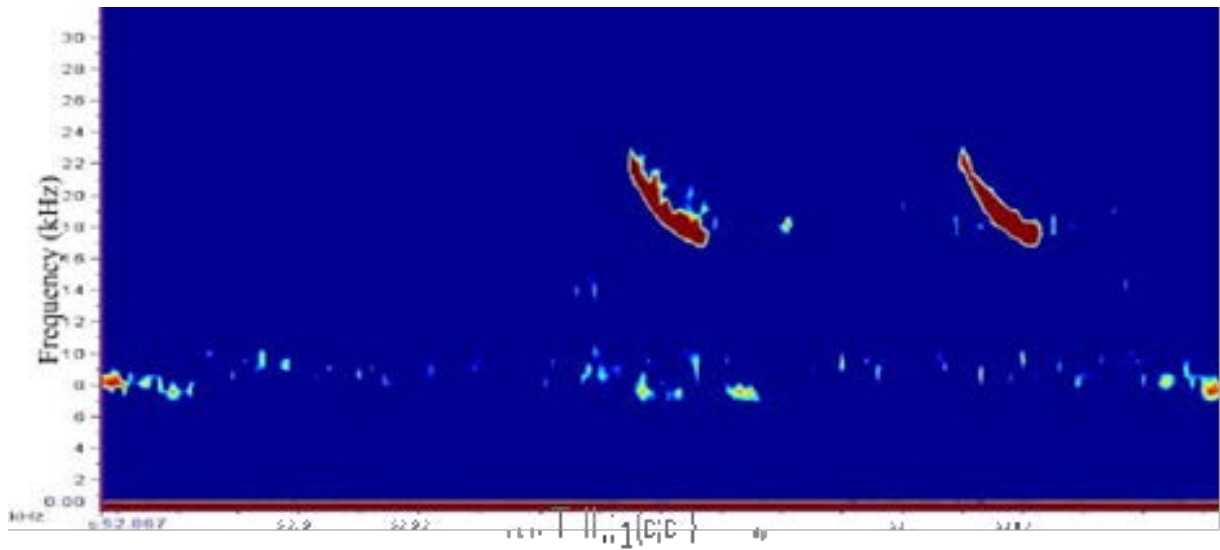
In Tal Chhapar Sanctuary we were able to detect echolocation calls of five bat species, *Pipistrellus tenuis*, *Pipistrellus ceylonicus* / *Scotophilus kuhlii*, *Tadarida aegyptiaca*, *Rhinopoma hardwickii*, and *Rhinolophus lepidus*. The presence of the last is particularly noteworthy, as it is usually found in closed habitats, and yet we picked it up in the grasslands as well.



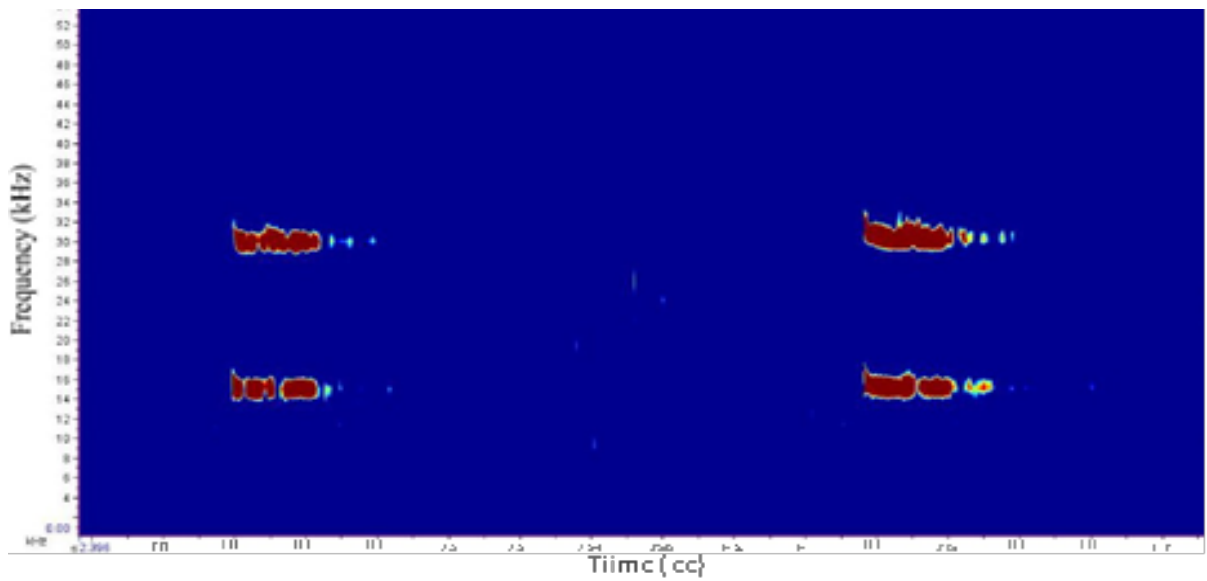
*Pipistrellus tenuis*



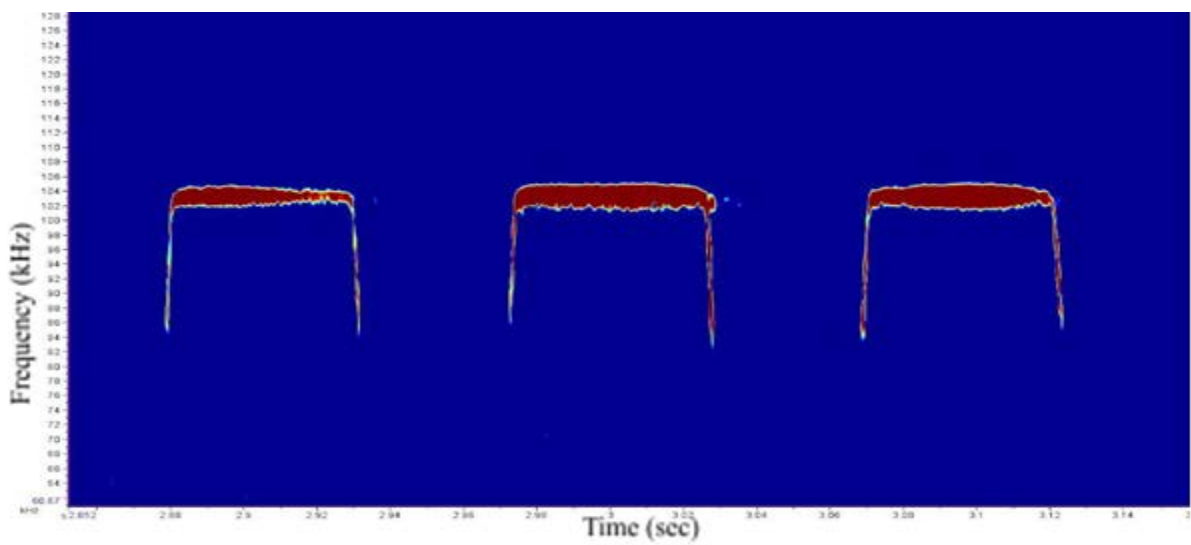
*Pipistrellus ceylonicus/Scotophilus kuhlii*



*Tadarida aegyptiaca*



*Rhinopoma hardwickii*



*Rhinolophus lepidus*



From the roost exploration sessions that were done in Jaipur and Tal Chhapar, colonies of lesser mouse-tailed bats were found in Amer fort in Jaipur and in a house and an old school building in Tal Chhapar village. A small colony of 2-3 individuals of lesser mouse tailed bats were found to be roosting inside a dark room in Amer fort. Bat colonies in Tal Chhapar numbered around 150 bats



An old building which had signs of earlier presence of large colonies of insectivorous bats



A colony of Lesser mouse-tailed bats

### **Discussion on the next phase of our project**

Since audio analysis is time consuming, we are still analysing the bulk of our data. We plan to work on data collection and analysis simultaneously and decided to conduct an additional field session before peak summer for studying the activity pattern of only bats due to the limited availability of water sources in summer. During the southwest monsoon, we will also collect our second batch of passive acoustic data for birds. This is important as the season will see a change in the bird community, as many passage migrants like European rollers and blue-cheeked bee eaters will show up at our field sites. Monitoring these will tell us how migratory arrival timings change over years. Furthermore, we will also connect with local bird guides to try and locate the white-browed bushchat and the white-naped tit in surrounding areas, in order to record them and identify other sites for monitoring.

In the summer field sessions, we will also connect with local schools and community heads in order to plan our outreach programmes for the winter season. Depending on our audience, we aim to develop our materials accordingly, as well as discuss our plans with the forest department officials for logistical support for on-field programmes involving bird and bat watching.