

HABITAT ANALYSIS OF *Scotophilus heathii* Horsfield, 1831 IN NORTHWESTERN PARTS OF PAKISTAN

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ABSTRACT

The present study was conducted to explore the habitat sites occupied by *Scotophilus heathii* Horsfield, 1831 in two sub-tropical and arid zones of districts Peshawar and Mardan in north western parts of Pakistan. During the present study 514 bats were observed where they were potentially abundant for a period of two years from July 2011 to May 2013. They were observed to fly in the open environment in Syedabad in an old farm house above and an old stagnant water pond provided with a thick vegetation layer, where various arthropods like mosquitoes, moths, and beetles were abundant. A colony (n=347) of *S. heathii* bats was observed in the cracks in the ceiling of marble factory. The surrounding of this habitat was comprised of many tree species like *Acacia*, *Dalbergia sissoo*, *Ziziphus jujube*, *Ziziphus mauritania*, *Eucalyptus globulus*, *Morus alba* and *Morus nigra*. While at another habitat about (n=147) bats were observed in the open environment above a small water channel near an old mud made building. They were coming to forage above the stream at a large height. A permanent roost of these bats was found in the ceiling of an old mud made building. This was a diurnal roost, situated near land farms comprised of abundant vegetation and crops like maize, wheat, sugarcane and tobacco. This paper documents new information regarding various habitats occupied by *S. heathii* to the bats map of Pakistan. A detailed research about their ecology and molecular biology needed to explore potential threats and conservation of the species.

Key words: *Chiroptera*, morphology, Charsadda, greater Asiatic yellow bat, Pakistan

INTRODUCTION

Scotophilus heathii Horsfield, 1831 has huge distribution in Asian countries from Afghanistan to South China, South to Sri Lanka, Burma, Cambodia, Thailand and Vietnam (Bates and Harrison, 1997). It is also widespread and common in the Indus plain of Pakistan and reported from other territories including Bahawalpur Fish Hatchery, Dalwal, Islamabad city, Kalian Daas in Punjab, Multan, NARC, Rawal Town, PMNH, Lahore in Punjab and Kohat in Khyber Pakhtunkhwa, Jaccobabad, Kashmore, Sakkar, Mirpur Sakro, Karachi, Landi, Dadu (Sindh), Sialkot and Lahore districts in Punjab (Wroughten, 1916; Lindsay, 1926; Siddique, 1960; Taber *et al.* 1967; Walton, 1974; Roberts, 1997). Diurnal roosts of these bats include crevices and hollows in old buildings, hollow banyan and pepal trees, leaf stems in the crowns of coconut palms and also found in the roofs of the houses. According to Krishna and Dominik (1985) males and females have different roosting sites except in the breeding season where harems of 2 to 6 females are found in association with a single adult male. Their colony size varies between one and fifty and there may be

several clusters of individuals occupying different locations in the same house. They emerge immediately 6 to 26 minutes after sunset, except in the heavy rain when they apparently remain in the roost. They move with steady speed, flying more or less straight for several hundreds of meters with few twists and turns. They do not fly 3 to 4 meters above the ground when pursuing prey.

Pakistan bat fauna is more or less similar to regions having same climatic conditions. There are 50 bat species, belonging to 8 families and 26 genera, while complete taxa is still unknown (Roberts, 1997).

Habitat loss, human interference and deforestation have changed bat distribution in the world (Lane *et al.* 2006; IUCN, 2009). Bats play an important ecological role (Fujita and Tuttle, 1991) and are universally important biological indicators (Jones *et al.* 2009). They are important pollinators and seed dispersal agents which maintain plant diversity and ecological balance (Marshall, 1983; Cox *et al.* 1991; Fujita and Tuttle, 1991; Mickleburgh *et al.* 1992; Rainy *et al.* 1995; Eby, 1996; Banak, 1998). As this bat species was only explored by Roberts (1997) in Kohat only, while not

studied in other parts of the Khyber Pakhtunkhwa, the present study was designed to explore its presence in the yet unexplored areas of Khyber Pakhtoonkhawa and to study its population dynamics.

MATERIALS AND METHODS

Study area: The present research was carried out on bats in Districts Mardan and Peshawar in KP, Pakistan. In these areas, rainfall ranges from 500-1750 mm. However, in Peshawar, there is the highest rainfall during February-April. Winter starts in mid-November and ends in February with temperature 4-18°C. The summer season starts from May and ends in August with temperature 25-40°C. Highest rainfall, 236 mm was recorded during winters in February 2007, while in summer, 402 mm was recorded in July 2010. The relative humidity varies from 46% in June to 76% in August.

The climatic condition of the area is dry and rough in summer, while mild and cold in winter. The soil of the area is fertile and a variety of crops and fruit orchards are grown in the area, included tobacco, sugarcane, wheat and maize, while persimmon, litchi, guava, plum, peach and citrus are the common fruits of the area.

The bats were searched and surveyed in the study area for a period of two years from May 2011 to July 2013. Various habitats including croplands, woodlands, main lands, crevices, caves, old buildings, ponds and canals were explored in two Districts Mardan and Peshawar, respectively.

RESULTS

The present research was conducted to explore the habitat and roost sites of *Scotophilus heathii* in the northwestern parts of the country including two counties Mardan and Peshawar for the very first time (Fig. 1). During July 2011 to May 2013, a total of 514 bats were collected from District Peshawar and Mardan and its adjacent areas in KP, Pakistan. *Scotophilus heathii* were abundant bats and were collected from Village Syedabad, Mazdurabad, Ghanu deri in District Mardan and Baghbanan in District Peshawar (Fig 2). They were observed to fly in the open environment in Syedabad in an old farm house and an old stagnant water pond provided with a thick vegetation layer, where various arthropods like mosquitoes, moths, and beetles were abundant. A colony (n=347) of *S. heathii* bats were observed in the cracks in the ceiling of a marble factory in this habitat. The surrounding of this habitat

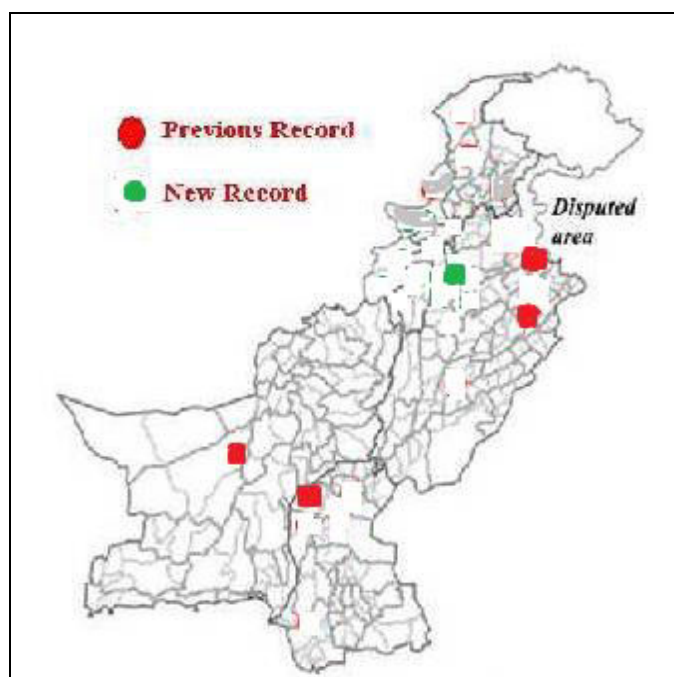


Fig. 1. Map of Pakistan highlighted with red shows old records of *Scotophilus heathii* and highlighted with green shows new record (Present study)



Fig. 2. *Scotophilus heathii* recorded from northwestern parts of Khyber Pakhtunkhwa, Pakistan May 2011 to July 2013

comprised of many tree species like *Acacia*, *Dalbergia sissoo*, *Ziziphus jujube*, *Ziziphus mauritania*, *Eucalyptus globulus*, *Morus alba* and *Morus nigra*. While at another

habitat about 147 bats were observed in the open environment above a small water channel near an old mud made building. They were coming to forage above

the stream at a large height. A permanent roost of these bats was found in the ceiling of an old mud made building. This was a diurnal roost, situated near land farms comprising of abundant vegetation and crops like maize, wheat, sugarcane, and tobacco. A detailed study about their molecular ecology and biology will be needed. The habitat occupied by them, almost had the same characteristics as already studied. It was concluded that *S. heathii* is the most abundant species to be found in the study area. They were found and explored for the first time in the northwestern parts of the country.

DISCUSSION

This findings confirm that *Scotophilus heathii* were found in a variety of habitats, including old buildings, crevices and cracks, among crown and leaves of palms and tree cavities. *Scotophilus heathii* were observed to be a widely distributed species and almost occupying a variety of habitats including Syedabad and Ghanu deri village in district Mardan from an old building crevice. They were found mostly in the arid and well irrigated land farms where proper vegetation and water bodies were abundant that could harbour dense arthropods populations. It was noted that the diurnal roosts of these species include crevices and hollows in old buildings peepal tree and Banyan. These species are not shy of light and can live in well-lit areas in the roofs of the houses. During the present study, they were collected from an open water pond in Galabad Village and wooden ceiling in Ajun Garhi, District Peshawar. This roost was located in an agriculture landform, where a variety of crops and vegetation was grown. While in District Mardan they were recorded from Ghanu Deri and Mazdurabad, 25 km away from Mardan city. The Ghanu Deri roost was present in an old mud made tobacco furnace, comprised of about 50 individuals. This roost was also present in an agriculture land farm and vegetation landscapes. *Scotophilus heathii* was recorded by Roberts (1997) from District Kohat. This species was found to be widespread in the study area of the Khyber Pakhtunkhwa and was found to be recorded for the first time from District Peshawar and Mardan, KP, Pakistan.

Conclusion: During the present research habitat sites of the *S. heathii* were explored for the first time and identified as the most abundant species in two Districts Peshawar and Mardan of Khyber Pakhtunkhwa. This bat was common in the old buildings, crevices and cracks of the walls in the study area.

Recommendations: Further study on their biology, ecology and conservation will be needed to cover the complete aspects of their study. While, their genetic analysis will be a new addition to the field of genetics. Some important conservation measures are needed immediately to protect them.

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