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Studies on diversity of charadriiformes (Chordata: Aves) in Chandertal wildlife sanctuary, Himachal Pradesh, India

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Abstract
The studies on diversity of order Charadriiformes (Aves) in Chandertal Wildlife Sanctuary, covering an area of 38.53 sq. km. at an elevation more than 4200 meters in Trans Himalayas is above tree line in which various field trips were organized in different months of year except winters (November to May) due to excessive snowfall at Rohtang pass and Kunzam pass resulting into inaccessible roads. Since the biodiversity decreases with increasing altitude above tree line, similarly our study revealed the presence of only four species belonging to three families of order Charadriiformes *viz*. *Gallinago solitaria*; *Calidris minuta* (Scolopacidae), *Charadrius mongolus* (Charadriidae) and *Himantopus himantopus* (Recurvirostridae).

Keywords: Chandertal wildlife sanctuary, high altitude, diversity, charadriiformes

Introduction
Chandra *et al.* (2016) [1] have reported 1340 avian species from India. Mandal *et al*. (2018) [8] have reported 940 species of birds from Indian Himalayas out of which 361 species found in Trans Himalayas. There are 447 avian species inhabiting Himachal Pradesh of which Lahaul & Spiti district harbours only 74 avian species. In the relative percentage of residential status of birds of Himachal Pradesh, Lahaul & Spiti district represent about 45% birds as resident to Himalayas, 21% as summer visitor, 19% as seasonal altitudinal migrant, 9% as resident with local movements and only 2-3% as winter visitor (Mahabal 2005) [6]. The avian diversity of the Trans-Himalayan cold desert of Ladakh is represented by 310 species belonging to 150 genera of 50 families and 16 orders (Tak *et al.*, 2008) [13]. Our studied area the Chandertal wildlife sanctuary occupies significant Chandertal wetland designated as an internationally known Ramsar site situated near little below the famous Kunzam Pass (4520 m above msl) on Manali –Kaza state highway no. 30. The sanctuary is situated at 32^0 29'N latitude and 77^0 36'E longitude with an altitude of 4337-4830 m above mean sea level, falling in the 1 B Tibetan Plateau Biogeographic zone and wetland exhibits along with few small semi-permanent land locked water reservoirs, a big half-moon shaped rock basin Lake (4270 m above msl) formed by glacial melt in land locked depression with single outlet which drains down into Chandra river. The sanctuary area remain snow covered for about five months of year as well as major pass like Rohtang and Kunzam pass making it inaccessible for humans via land transport. From such high altitude and semi-arid area, we observed four species belonging to order Charadriiformes.

Materials and Methods
Various scientific field surveys were carried out in the study area from June to early October months and major observations were made in, on and around the lake and other semi-permanent water bodies present in the sanctuary along with meadows and pasture. The steppe, sandy floor and rock crevices were also observed for nesting habits etc. The identifying features of birds were observed with 10 × 50 super Zenith field binocular along with 1000 mm tally lens of Quester make and information's written in field note book. All these birds described here were found mostly near the marshy area, banks or coasts of water reservoir where we made artificial hideout for observing their habits and morphology by being statue or

standstill. Nikon D-80 camera with zoom tele-lenses was used for field photography of birds and those images used for comparision with already identified species. The identification of birds was carried out with the help of field guides of Grimmett *et al.* (1998) [2] and Kumar *et al.* (2005) [5] and nomenclature of Manakadan and Pittie (2001) [7] followed.

Results and Discussions: Due to their feeding habits, these four birds described here were found mostly near the marshy area, banks or coasts of water reservoirs. The Chandertal Lake inhabited mostly by huge number of aquatic *Gammarus* species and larvae of trichopteran flies. Wetland are reservoir of biodiversity by providing habitat for flora and fauna so that complex food web maintained. In this high altitude Chandertal wetland and wildlife sanctuary we observed various invertebrates (mostly hibernating) and birds and mammals (mostly migratory and very few residents in lower altitude along river basin) Singh and Thakur (2012, 2013, 2021) [10, 11, 12]. Mani (1990) have also reported some species belonging to Noctuidae, Nymphalidae, Satyridae, Pieridae and Lycaenidae from high altitude of Himalaya. Species diversity in such high altitude semi-arid area found to be very less. Our study revealed the presence of only four species belonging to three families of order Charadriiformes *viz. Gallinago solitaria* and *Calidris minuta* (Scolopacidae), *Charadrius mongolus* (Charadriidae) and *Himantopus himantopus* (Recurvirostridae) from the Chandertal wildlife sanctuary during the scientific tours of different survey years. We recorded adults along with their juveniles of *Charadrius mongolus* which make this sanctuary as breeding ground at such a high altitude above the tree line (Singh and Thakur, 2012) [10]. The studied area harbors four species belonging to Charadriiformes signifies that there is decrease in biodiversity with increasing altitude above tree line (Kikkawa and Williams, 1971) [4]. Inskipp and Inskipp (1985) [3] reported that avian diversity is rich in Eastern Himalayas than Western Himalayas while it is least diverse in Trans Himalayas. Systematic position and description of recorded avian species is as follows.

Table 1: 1776. *Charadrius mongolus* Pallas

Class	**Aves**	
Order	Charadriiformes	
Family	Charadridae	
Genus	*Charadrius*	
Species	*mongolus*	

Common Name: Lesser Sand Plover

Description: Black bill and greenish-grey legs. Non-breeding male: broad white face divided by dark brownish patch behind eyes, upper parts are sandy grayish-brown and underparts white. Breeding male: forehead and sides of head black, crown and neck rusty, remaining upper parts are sandy brown. Female with pale orange breast band.

Habitat: Mostly observed in sandy plains and inside coastal water in the northern vicinity of Chandertal lake.

Habits: Make small flock, sometimes larger. Rests on one leg sometimes. Feeds mostly on aquatic molluscs, crustaceans and insect's larvae.

Distribution: Resident between 3900 - 5500 m in Ladakh, Lahaul & Spiti and Sikkim. India, Pakistan, Nepal and Bhutan.

Table 2: 1758. *Charadrius himantopus* Linnaeus, Syst. Nat., ed. 10, 1:151.

Class	**Aves**	
Order	Charadriiformes	
Family	Recurvirostridae	
Genus	*Himantopus*	
Species	*himantopus*	

Common Name: Black Winged Stilt.

Description: Black bill and reddish legs. Black and white wader with painted wings. Male: white head with some black spots, wings glossy black, tail pale grey-brown and remaining body glossy white. Female: head and hind neck off white, brownish wings.

Habitat: Since possess long legs so mostly observed in lake coastal water upto four feet from bank of Chandertal lake.

Habits: Occurs in small flock, walks slowly, forages by wading or on dry mud. Sometime may float for feeding. Feeds mostly aquatic molluscs, crustaceans, insect's larvae and seeds also.

Distribution: India, Pakistan, Nepal, Bhutan, Sri Lanka and Maldives.

Table 3: 1831. *Capella solitaria* Hodgson, Glean. Sci., 3(32): 238.

Class	**Aves**	
Order	Charadriiformes	
Family	Scolopacidae	
Genus	*Gallinago*	
Species	*solitaria*	

Common Name: Solitary Snipe

Description: Solitary snipe is dull coloured and about 29 to 31 cm long. Breast is ginger brown along with white spots and rufous barring on mantel and scapulars with finer white mantle and scapulars stripes. Long bill appears slight upturned. Legs are yellowish coloured. Voice is deep harsh Kensh while during flight it utters a deep chok-achock-a call, combined with mechanical bleating produced by outer tail feathers.

Habitat: Mostly observed around marshy landlocked water reservoirs situated about 500 meters from Chandertal lake on western side where minimum or no tourists visits.

Habits: Most of time it remain solitary. When disturbed or excited it ran like zigzag manner or fly heavily and produce louder and harsh call. Male snipe shows aerial drumming

during breeding season.

Distribution: Resident and subject to altitudinal migration especially winter visitor. Baluchistan, Pakistan East to Arunachal Pradesh and North East India. In Nepal it is uncommon and local winter visitor and passage migrant; India, uncommon summers 2400 -4600 m, winters from 1200 - 3000 m; Bhutan, uncommon. Bangladesh, vagarant.

Table 4: 1812. *Tringa minuta* Leisler, Nachtrage zu Bechstein's Naturg. Dutschl, p. 74.

Class	**Aves**	
Order	Charadriiformes	
Family	Scolopacidae	
Genus	*Calidris*	
Species	*minuta*	

Common Name: Little Stint.

Description: Black bill, legs and feet. Non-breeding: forehead and supercilia white, upperparts scaly grey-brown, underparts white with faint streak on breast. Breeding: forehead and supercilia obsolete pale fawn, feather on back are black with broad rufous edges.

Habitat: Sometimes visit Chandertal Lake but mostly observed around marshy landlocked water reservoirs situated about 500 meters from Chandertal Lake on western side.

Habits: Make small or large flock, constantly walks or runs around mud for picking up food but when disturbed, whole flock flies away simultaneously. Feeds mostly aquatic molluscs, crustaceans and trichopteran larvae.

Conclusions

Species diversity found to be very less. Although the studied area is protected as wildlife sanctuary but still strict protective measures must be implemented especially during peak tourist season which directly or indirectly deteriorates the natural environment and natural isolation of this area needed for rich biodiversity. As studied area found to be breeding ground for *Charadrius mongolus* therefore it is essential for perpetuation of some species. We documented four species of order Charadriiformes *viz*. *Gallinago solitaria*; *Calidris minuta* (Scolopacidae), *Charadrius mongolus* (Charadriidae) and *Himantopus himantopus* (Recurvirostridae).

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