



Seasonal Variation of Diversity of Bird Species at Satpura Forest Reserve, Khandwa District (M.P.)

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Abstract : West Nimar (Khandwa) have a wide variety of avifauna. The primary scheme of the study was to analyze Year round variation of avian species diversity of various sites of Satpura forest Reserve from January 2017 to December 2018 at Khandwa district (M.P.) Nagchoon, Nahalda, Hapla-Deepla and Junapani were the four observation sites as A, B, C & D respectively selected for the observation. Different species of birds found during the observation in which sixteen orders and the families recorded were 39 in a year at the different observation sites out of which 58 species at Site A-Nagchoon, 44 species at site B-Nahalda, 51 species at site C-Hapla-Deepla and 43 species at site D-Junapani.

IndexTerms - Bird, Nagchoon, Nahalda, Hapla-Deepla, Junapani, Diversity.

I. INTRODUCTION

Defining biological diversity as “the total variability of life on earth” (Heywood, 1995). According to area India is at seventh position in the world. It covers above three million square km area of the world. The tremendous difference in the geographical condition if country provides it high range of biological diversity (Ahmedullah, 1987). Madhya Pradesh is situated at central part of India which is among the top three largest states and comes at second place in country according to area. It is also the state having the largest covering of forest in terms of area. Birds are one of the most abundant and common creatures amongst entire wild life. But due to continues expansion of human habitats in form of cities, mining areas for commercial benefits and other human activities decreasing the avian community with decreasing in their shelter area (Austin *et al.*, 1972) and (Joshi, 2001).

Avian species can also be considered as the organisms for the establishment of equilibrium of the environment. Bird not only help in spreading the seeds but also helps in spreading pollens for pollination. Birds are also used to estimate the diversity of organism in a natural system (Joshi, 2001). Researching wildlife conformation by the side of metropolitan-village or rural point of view supports to know different operations at territorial level (Robert *et al.*, 2008)

II. MATERIAL AND METHOD

Study Area:

The Satpura forest area in Khandwa district Madhya Pradesh is selected for the study. The selected observation area is comprised of various factors like water bodies and some silent territorial zones which are suitable for birds.

Observation Site:

Four observation sites of Khandwa district were selected for the present study. This observation sites are as follows.

- 1) Observation Site A-Nagchoon.
- 2) Observation Site B-Nahalda.
- 3) Observation Site C-Hapla-Deepla.
- 4) Observation Site D-Junapani.

Methods:

The observation was conducted during all seasons from January 2017 to December 2018 and covers all three seasons (winter, summer & rain). The observation was mainly conducted during the first half and second half of the day. It was estimate 6-7 hours in a day.

Avian species information was collected during all three seasons on the all four observation sites by conducting regular field visits and surveys. Photographs were captured on the field to identify the birds later.

Instruments:

Various instruments were used for the observation on the field such as Binocular, digital camera (Nikon) with 200-500 lens and laptop for data analysis.

Identification of species:

The birds were chiefly recognized via books (Grimiit *et al.*,2015). The scientific and local name of the birds have been taken from (Ali, 2002) and (Grewal *et al.*, 2002).

Visual Methods:

The methods used in this study are as follows-

- a. Point Count Method.
- b. Look and See Method.
- c. Direct Count Method.

III. RESULT

The observation outcome shows that total 58 species were recorded at observation site A-Nagchoon. There was seasonal variation in the species recorded as around 53 species in the wintertime at site A-Nagchoon. While in summertime 29 species were observed. In the rain time 48 species were observed.

At observation site B-Nahalda we observed total 44 species. There were forty avian species found in the wintertime. In summer time we recorded thirty species and during the rain time the species recorded were 35 in number.

The observation outcome shows that overall, 51 species were recorded at observation site C-Hapla-Deepla. The number of species found in wintertime was 46. After that the recorded species of summertime were 33 in number. The number of species observed and recorded in rain time was forty at Hapla-Deepla.

Site D-Junapani, where we found around 43 species throughout the observation period. In wintertime the species found were 38 in number. Total numbers of species were 28 in summertime while the numbers of species in rain time were 37.

Table 1:- Year Round Variation of Avian Species At Site A-Nagchoon.

Numbers	Name of Birds		Name of seasons		
	Scientific Name	General name	Winter	Summer	Rain
3	<i>Acridotheres tristis</i>	Common Myna	F	F	F
2	<i>Actitis hypoleucos</i>	Common sandpiper	F	Nf	F
3	<i>Alcedo atthis</i>	Common Kingfisher	F	F	F
3	<i>Amaurornis phoenicurus</i>	White breasted waterhen	F	F	F
2	<i>Anas poecilorhyncha</i>	Indian spot billed duck	F	Nf	F
2	<i>Anastomus oscitans</i>	Asian open bill	F	Nf	F
2	<i>Andea cinerea</i>	Grey Heron	Nf	F	F
3	<i>Ardeola grayii</i>	Indian Pond Heron	F	F	F
2	<i>Aythya ferina</i>	Common pochard	F	Nf	F
3	<i>Bubulcus Ibis</i>	Cattle Egret	F	F	F
2	<i>Casmerodius albus</i>	Great Egret	F	Nf	F
1	<i>Cecropis daurica</i>	Red rumped swallow	F	Nf	Nf
3	<i>Ceryle rudis</i>	Pied Kingfisher	F	F	F

2	<i>Charadrius hiaticula</i>	Common Ringed Plover	F	Nf	F
3	<i>Cinnyris asiaticus</i>	Purple Sunbird	F	F	F
3	<i>Columba livia</i>	Rock Pigeon	F	F	F
3	<i>Copsychus saularis</i>	Oriental magpie robin	F	F	F
3	<i>Corvus splendens</i>	Common Crow	F	F	F
2	<i>Dendrocygna javanica</i>	Lesser whistling duck	F	Nf	F
3	<i>Dicrurus macrocercus</i>	Black drongo	F	F	F
3	<i>Egretta garzetta</i>	Little egret	F	F	F
2	<i>Elanus axillaris</i>	Black shouldered kite	F	Nf	F
3	<i>Euodice malabarica</i>	Indian silverbill	F	F	F
2	<i>Fulica atra</i>	Eurasian coot	F	Nf	F
2	<i>Gracupica contra</i>	Asian pied starling	Nf	F	F
3	<i>Halcyon smyrnensis</i>	White throated kingfisher	F	F	F
2	<i>Himantopus himantopus</i>	Black winged stilt	F	Nf	F
1	<i>Hirundo rustica</i>	Barn swallow	F	Nf	Nf
1	<i>Hydrophasianus chirurgus</i>	Pheasant tailed jacana	F	Nf	Nf
1	<i>Leptocoma zeylonica</i>	Purple rumped sunbird	F	Nf	Nf
3	<i>Merops orientalis</i>	Green Bee eater	F	F	F
3	<i>Motacilla alba</i>	White wagtail	F	F	F
3	<i>Motacilla maderaspatensis</i>	White browed wagtail	F	F	F
2	<i>Nettapus coromandelianus</i>	Cotton pygmy goose	F	Nf	F
3	<i>Passer domesticus</i>	House sparrow	F	F	F
2	<i>Phalacrocorax carbo</i>	Great cormorant	F	Nf	F
3	<i>Phalacrocorax fuscicollis</i>	Indian cormorant	F	F	F
2	<i>Phalacrocorax niger</i>	Little cormorant	F	F	Nf
1	<i>Plegadis falcinellus</i>	Glossy ibis	F	Nf	Nf
3	<i>Prinia hodgsonii</i>	Grey breasted prinia	F	F	F
3	<i>Prinia inornata</i>	Plain prinia	F	F	F
3	<i>Prinia socialis</i>	Ashy prinia	F	F	F
1	<i>Pseudibis papillosa</i>	Red naped ibis	F	Nf	Nf
2	<i>Psittacula krameri</i>	Rose ringed parakeet	F	Nf	F
3	<i>Ptyonoprogne concolor</i>	Dusky crag martin	F	F	F
3	<i>Pycnonotus cafer</i>	Red vented bulbul	F	F	F
2	<i>Sarkidiornis melanotos</i>	Knob billed duck	F	Nf	F
3	<i>Spilopelia senegalensis</i>	Little Brown Dove	F	F	F
1	<i>Sterna aurantia</i>	River tern	Nf	Nf	F
2	<i>Streptopelia chinensis</i>	Spotted Dove	F	Nf	F
2	<i>Sturnia pagodarum</i>	Brahminy Starling	F	Nf	F
2	<i>Tachybaptus ruficollis</i>	Little grebe	F	Nf	F
1	<i>Tadorna ferruginea</i>	Ruddy shelduck	F	Nf	Nf
1	<i>Threskiornis melanocephalus</i>	Black headed ibis	F	Nf	Nf
1	<i>Tringa glareola</i>	Wood Sandpiper	Nf	Nf	F
1	<i>Tringa stagnatilis</i>	Marsh sandpiper	Nf	Nf	F

1	<i>Upupa epops</i>	Eurasian hoopoe	F	Nf	Nf
3	<i>Vanellus indicus</i>	Red wattled lapwing	F	F	F
Total number of birds-58			Total-53	Total-29	Total-48
-Found, Nf-Not Found					

TABLE:- 2 YEAR ROUND VARIATION OF AVIAN SPECIES AT SITE B-NAHALDA

Numbers	Name of Birds		Name of Seasons		
	Scientific Name	General Name	Winter	Summer	Rain
2	<i>Accipiter badis</i>	Shikra	F	Nf	F
2	<i>Elanus axillaris</i>	Black shouldered kite	F	Nf	F
1	<i>Butastur teesa</i>	White eyed buzzard	Nf	F	Nf
3	<i>Ocyrceros birostris</i>	Grey hornbill	F	F	F
3	<i>Vanellus Indicus</i>	Red wattled lapwing	F	F	F
3	<i>Columba livia</i>	Rock Pigeon	F	F	F
3	<i>Streptopelia senegalensis</i>	Laughing dove	F	F	F
2	<i>Coracias benghalensis</i>	Indian roller	F	Nf	F
3	<i>Halcyon smyrnensis</i>	White throated kingfisher	F	F	F
3	<i>Merops oorientalis</i>	Green Bee eater	F	F	F
3	<i>Alcedo atthis</i>	Common Kingfisher	F	F	F
1	<i>Centropus sinensis</i>	Greater Coucal	Nf	F	Nf
2	<i>Eudynamys scolopaceus</i>	Asian koel	Nf	F	F
3	<i>Prinia socialis</i>	Ashy prinia	F	F	F
3	<i>Copsychus saularis</i>	Oriental magpie robin	F	F	F
3	<i>Aegithina tiphia</i>	Common iora	F	F	F
3	<i>Acridotheres tristis</i>	Common myna	F	F	F
3	<i>Corvus splendens</i>	House crow	F	F	F
1	<i>Luscinia svecica</i>	Bluethroat	F	Nf	Nf
1	<i>Cecropis daurica</i>	Red rumped swallow	F	Nf	Nf
3	<i>Orthotomus sutorius</i>	Common tailorbird	F	F	F
1	<i>Hirundo rustica</i>	Barn swallow	F	Nf	Nf
2	<i>Motacilla Maderaspatensis</i>	White browed wagtail	F	Nf	F
3	<i>Dendrocitta vagabunda</i>	Rofous treepie	F	F	F
3	<i>Pycnonotus cafer</i>	Red vented bulbul	F	F	F
2	<i>Chrysomma sinense</i>	Yellow eyed babbler	F	Nf	F
3	<i>Cinnyris asiaticus</i>	Purple sunbird	F	F	F
3	<i>Dicrurus macrocercus</i>	Black drongo	F	F	F
3	<i>Saxicolides fulicatus</i>	Indian robin	F	F	F
2	<i>Eremopterix griseus</i>	Ashy crowned sparrow lark	F	Nf	F
3	<i>Euodice malabarica</i>	Indian silverbill	F	F	F
2	<i>Acridotheres ginginianus</i>	Bank myna	F	F	Nf
3	<i>Prinia hodsonii</i>	Grey breasted prinia	F	F	F
3	<i>Corvus macrorhynchus</i>	Large billed crow	F	F	F
2	<i>Mycteria leucocephala</i>	Painted stork	F	Nf	F

2	<i>Sturnia pagodarum</i>	Brahminy starling	F	Nf	F
3	<i>Passer domesticus</i>	House Sparrow	F	F	F
1	<i>Pastor roseus</i>	Rosy starling	F	Nf	Nf
3	<i>Prinia inornata</i>	Plain prinia	F	F	F
3	<i>Bubulcus ibis</i>	Cattle egret	F	F	F
3	<i>Ardeola grayii</i>	Indian pond heron	F	F	F
1	<i>Pseudibis papillosa</i>	Red naped ibis	F	Nf	Nf
2	<i>Psittacula krameri</i>	Rose ringed parakeet	F	Nf	F
1	<i>Strix ocellata</i>	Mottled wood owl	Nf	F	Nf
Total number of birds-44			Total-40	Total-30	Total-35
F= Found, Nf = Not Found.					

TABLE 3:- YEAR ROUND VARIATION OF AVIAN SPECIES AT SITE C-HAPLA-DEEPLA.

Numbers	Name of Birds		Name of Seasons		
	Scientific Name new	General name	Winter	Summer	Rain
1	<i>Eremopterix griseus</i>	Ashy crowned sparrow lark	F	Nf	Nf
3	<i>Prinia socialis</i>	Ashy prinia	F	F	F
2	<i>Eudynamys scolopaceus</i>	Asian koel	Nf	F	F
1	<i>Anastomus oscitans</i>	Asian openbill	F	Nf	Nf
1	<i>Gracupica contra</i>	Asian pied starling	Nf	F	Nf
3	<i>Dicrurus macrocercus</i>	Black drongo	F	F	F
1	<i>Threskiornis melanocephalus</i>	Black headed ibis	F	Nf	Nf
3	<i>Milvus migrans</i>	Black kite	F	F	F
2	<i>Elanus axillaris</i>	Black shouldered kite	F	Nf	F
1	<i>Luscinia svecica</i>	Bluethroat	F	Nf	Nf
2	<i>Sturnia pagodarum</i>	Brahminy starling	F	Nf	F
3	<i>Bubulcus ibis</i>	Cattle egret	F	F	F
3	<i>Aegithina tiphia</i>	Common iora	F	F	F
3	<i>Alcedo atthis</i>	Common kingfisher	F	F	F
3	<i>Acridotheres tristis</i>	Common myna	F	F	F
3	<i>Ptyonoprogne concolor</i>	Dusky crag martin	F	F	F
1	<i>Centropus sinensis</i>	Greater coucal	Nf	F	Nf
3	<i>Merops orientalis</i>	Green Bee eater	F	F	F
3	<i>Prinia Hodgsonii</i>	Grey breasted prinia	F	F	F
1	<i>Francolinus pondicerianus</i>	Grey francolin	Nf	Nf	F
3	<i>Ocyrceros birostris</i>	Grey hornbill	F	F	F
3	<i>Corvus splendens</i>	House crow	F	F	F
3	<i>Passer domesticus</i>	House sparrow	F	F	F
3	<i>Ardeola grayii</i>	Indian pond heron	F	F	F
3	<i>Saxicoloides fulicatus</i>	Indian robin	F	F	F
3	<i>Coracias benghalensis</i>	Indian roller	F	F	F
3	<i>Euodice malabarica</i>	Indian Silverbill	F	F	F
3	<i>Tudoides striata</i>	Jungle babbler	F	F	F

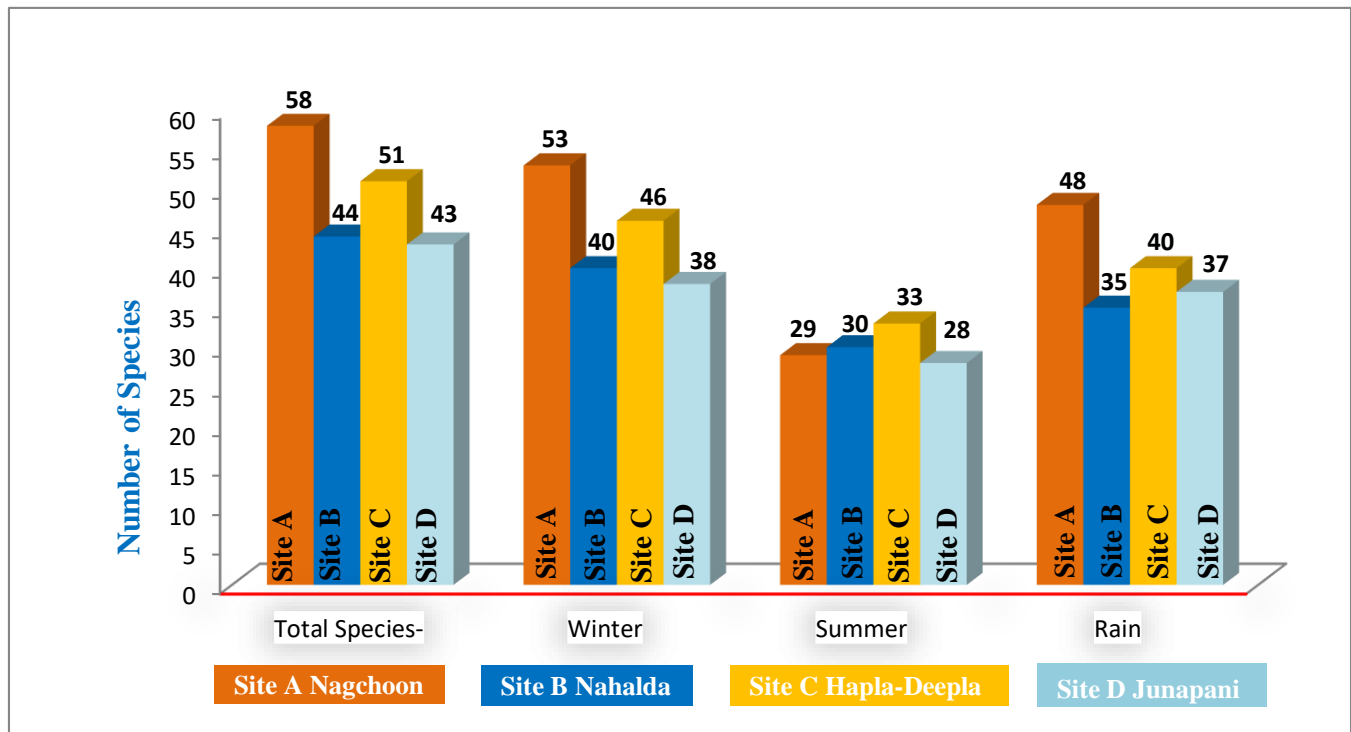
3	<i>Corvus macrorhynchos</i>	Large billed crow	F	F	F
3	<i>Streptopelia senegalensis</i>	Laughing Dove	F	F	F
1	<i>Microcarbo niger</i>	Little cormorant	F	Nf	Nf
1	<i>Lanius schach</i>	Long tailed shrike	Nf	Nf	F
3	<i>Copsychus saularis</i>	Oriental magpie robin	F	F	F
2	<i>Mycteria leucocephala</i>	Painted stork	F	Nf	F
3	<i>Ceryle rudis</i>	Pied kingfisher	F	F	F
3	<i>Prinia inornata</i>	Plain prinia	F	F	F
1	<i>Psittacula cyanocephala</i>	Plum headed parakeet	F	Nf	Nf
1	<i>Leptocoma zeylonica</i>	Purple rumped sunbird	F	Nf	Nf
3	<i>Cinnyris asiaticus</i>	Purple sunbird	F	F	F
3	<i>Pycnonotus cafer</i>	Red vented bulbul	F	F	F
3	<i>Vanellus indicus</i>	Red wattled lapwing	F	F	F
2	<i>Psittacula krameri</i>	Rose ringed parakeet	F	Nf	F
1	<i>Pastor roseus</i>	Rosy starling	F	Nf	Nf
3	<i>Dendrocitta vagabunda</i>	Rofous treepie	F	F	F
2	<i>Accipiter badius</i>	Shikra	F	Nf	F
3	<i>Petrochelidon fluvicola</i>	Streak throated swallow	F	F	F
1	<i>Motacilla flava</i>	Western yellow wagtail	F	Nf	Nf
2	<i>Amuornis phoenicurus</i>	White breasted waterhen	F	Nf	F
3	<i>Motacilla maderaspatensis</i>	White browed wagtail	F	F	F
3	<i>Halcyon smyrnensis</i>	White throated kingfisher	F	F	F
2	<i>Chrysomma sinense</i>	Yellow eyed babbler	F	Nf	F
Total number of birds-51			Total-46	Total-33	Total-40
F= Found, Nf = Not Found.					

Table 4:- Year Round Variation of Avian Species at Site D-Junapani

Numbers	Name of Birds		Name of Seasons		
	Scientific Name new	General name of bird	Winter	Summer	Rain
1	<i>Psittacula eupatria</i>	Alexandrine parakeet	Nf	Nf	F
1	<i>Eremopterix griseus</i>	Ashy crowned sparrow lark	F	Nf	Nf
3	<i>Prinia socialis</i>	Ashy prinia	F	F	F
2	<i>Eudynamis scolopaceus</i>	Asian koel	Nf	F	F
3	<i>Dicrurus macrircercus</i>	Black drongo	F	F	F
2	<i>Elanus axillaris</i>	Black shouldered kite	F	Nf	F
2	<i>Sturnia pagodarus</i>	Brahminy starling	F	Nf	F
1	<i>Cercomela fusca</i>	Brown rock chat	F	Nf	Nf
3	<i>Bubulcus ibis</i>	Cattle egret	F	F	F
3	<i>Alcedo atthis</i>	Common kingfisher	F	F	F
3	<i>Acridotheres tristis</i>	Common myna	F	F	F
3	<i>Orthotomus sutorius</i>	Common tailorbird	F	F	F
1	<i>Centropus sinensis</i>	Greater coucal	Nf	F	Nf
1	<i>Marops orientalis</i>	Green Bee eater	F	Nf	Nf
3	<i>Prinia hodgsoni</i>	Grey breasted prinia	F	F	F
3	<i>Ocyercus birostris</i>	Grey hornbill	F	F	F

3	<i>Corvus splendens</i>	House crow	F	F	F
3	<i>Passer domesticus</i>	House sparrow	F	F	F
3	<i>Ardeola grayii</i>	Indian pond heron	F	F	F
3	<i>Saxicoloides fulicatus</i>	Indian robin	F	F	F
2	<i>Coracias benghelensis</i>	Indian roller	F	Nf	F
3	<i>Euodice malabarica</i>	Indian silverbill	F	F	F
3	<i>Corvus macrorhynchos</i>	Large billed crow	F	F	F
3	<i>Spilopelia senegalensis</i>	Little brown dove	F	F	F
3	<i>Egretta garzetta</i>	Little egret	F	F	F
1	<i>Lanius schach</i>	Long tailed shrike	Nf	Nf	F
3	<i>Copsychus saularis</i>	Oriental magpie robin	F	F	F
3	<i>Mycteria leucocephala</i>	Painted stork	F	F	F
2	<i>Ceryle rudis</i>	Pied kingfisher	F	Nf	F
3	<i>Prinia inornata</i>	Plain prinia	F	F	F
3	<i>Cinnyris asiaticus</i>	Purple sunbird	F	F	F
3	<i>Pycnonotus cafer</i>	Red vented bulbul	F	F	F
3	<i>Vanellus indicus</i>	Red wattled lapwing	F	F	F
3	<i>Columba livia</i>	Rock pigeon	F	F	F
2	<i>Psittacula krameri</i>	Rose ringed parakeet	F	Nf	F
2	<i>Accipiter badius</i>	Shikra	F	Nf	F
2	<i>Streptopelia chinensis</i>	Spotted dove	F	Nf	F
3	<i>Petrochelidon fluvicola</i>	Streak throated swallow	F	F	F
2	<i>Motacilla maderaspatensis</i>	White browed wagtail	F	Nf	F
1	<i>Butastur tees</i>	White eyed buzzard	Nf	F	Nf
3	<i>Halcyon smyrnensis</i>	White throated kingfisher	F	F	F
1	<i>Motacila alba</i>	White wagtail	F	Nf	Nf
2	<i>Chrysomma sinense</i>	Yellow eyed babbler	F	Nf	F
Total number of birds-43			Total-38	Total-28	Total-37
F= Found, Nf = Not Found.					

GRAPH:- COMPARISON OF BIRD SPECIES OBSERVED AT ALL FOUR SITES.



DISCUSSION

Nagchoon as observation site A has a total of 58 species. In rain time 48 species were recorded and 53 species recorded in wintertime. The summertime species record was 29 only. Bird species recorded in wintertime is highest in number and least in summertime. Wetlands are very different in nature and ecosystem and potentially support largely unknown water bird concentration (Nikolaus, 1987), (Short, 1984) and (Goodman *et al.*, 1989).

An observation of lower diversity of birds in summer and higher in winter while studying on Delhi ridge also found. The similar unchanged observation was noted in 15 main lakes of Bangalore in 2008 (Rajashekara *et al.*, 2011) and (Gaston, 1978).

Nahalada as observation site B has the total bird record 44 in statistics during the observation period. The numbers of bird species in wintertime were 40. In summer the observed and recorded species were 30. While in rain time 55 species were recorded. Collectively the avian commune numbers were different according to the presence of food in different times of a year (Robert *et al.*, 2008). In the regions of Gujrat as an easternmost state of India water bodies supports services for various human activities it also low downs the warmness of that region and helps to maintain the biological variation (Soni *et al.*, 2007) and (Parikh *et al.*, 2016).

At observation site C Hapla-Deepla overall informed data of species were 51. During wintertime avian-species numbers were 46; in summertime 33 bird species were recorded and in rain time 40 species were recorded. In a district Kachh of Gujrat, 303 avian species and 370 bird species (Sen, 2012) and (Tiwari, 2011). Out of 1340 bird species found in India, 310 species are known to depend on different water bodies (Kumar and Gupta 2009). Fourteen species of water birds out of sampled 51 species belonging to 25 families in 13 orders along the Sirhind Canal in Punjab (Kler, 2009).

The fourth observation point Site D- Junapani, The total recorded species at this site was 43. The highest species found in winter time that is 38 in number. The lowest species in number recorded in summertime as 28 only. In rain time the numbers of recorded species were 37.

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