Avian Diversity, Abundance and Habitat Suitability Index for Threatened Species in Selected Areas of Northern Pakistan

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ABSTRACT

Land use type changes the carrying capacity of habitats to support species diversity and maintain viable population. Avian studies provide substantial information about these changes as birds are predictor of ecological disturbances. The current research explored the avian diversity, richness, abundance and their feeding habit in selected habitats of Khyber Pakhtunkhwa (KP) and Gilgit Baltistan (GB). Data were collected from May 2017 to October 2017 using point count technique. Thirty points were selected from each habitat. A total of 175 species and 24,933 individuals belonging to 16 orders and 55 families were recorded. Human settlements had the highest species richness (106) while Dry Temperate habitat had the highest value of species diversity (H’=3.71). The most abundant species were Common Myna Acridotheres tristis (RA=8.599), Carrion Crow Corvus corone (7.486), Large-billed Crow Corvus macrorhynchos (6.240). Two threatened bird species Steppe Eagle Aquila nipalensis and Western Tragopan Tragopan melanocephalus were observed. Habitat suitability index (HSI) of former species was maximum in rangelands (0.82) even though it was also observed in six habitats. Furthermore, Western Tragopan was found only in moist temperate habitat with HSI 0.70. The current study revealed that suitable habitat of these species is shrinking mainly due to habitat loss, its fragmentation and hunting pressure. Species prefer habitat with specific characteristics and this paper provides recommendations for the conservation and management of Steppe Eagle and Western Tragopan. Primary and secondary data based further studies are needed to manage the population of threatened species.

INTRODUCTION

The association between different habitat types and avian diversity is an important topic and for that matter, various researchers have explored the avian diversity in different rural and urban areas (Strohbach et al., 2013; Barth et al., 2015) and forestland (Mikusiński et al., 2001).

With the time, overexploitation, pollution, habitat destruction and climate change have caused reduction in biodiversity (Butchart et al., 2005), and comparative analysis of different geographical regions gives perceptions to the mechanisms involved with the change in biodiversity (Dornelas et al., 2014).

In avian studies, species richness and relative abundance are common to measure the diversity (Harisha and Hosetti, 2009) along with metrics that take relative abundance into account (Dornelas et al., 2014). Furthermore, species richness is an important factor for biological community and the factors affecting biodiversity need to be understood (Hurlbert, 2004). It must also be kept in mind that species richness has various technical limitations to be considered as a metric for biodiversity change (Hillebrand et al., 2017). In the current study, we have used it to report number of species in different habitats sampled within the same time period.
Furthermore, to study the spatial ecology, it is important to understand the relationship between species diversity and habitat heterogeneity (de Bonilla et al., 2012), as the latter is important predictor of species richness (Koh et al., 2006) and affects the ecological processes in many ways (Fahrig and Nuttle, 2005). It includes increase or decrease in size of species population (Cramer and Willing, 2005) and fluctuations in the composition of feeding guilds (Sekercioglu et al., 2004).

Bird abundance and composition vary with the change in vegetation and habitat characteristics (Blake, 2007). Habitat structure influences diet, microhabitat and body size; feeding guilds can be used to predict the impact of habitat change on species (Raman, 1998). Furthermore, habitat structure is an important factor that contributes to fluctuations in species richness, diversity, distribution and habitat selection (Watson et al., 2004; Mohd-Azlan et al., 2015). Habitat is a vital component for the survival of any species and as ecosystems are experiencing a variety of challenges such as, deforestation, over exploitation, over grazing and loss of natural habitat (Baig and Al-Subaiee, 2009), their extent needs to be studied and evaluation of status and patterns of these ecological systems in different geographic regions is also important. Habitat suitability Index helps in assessing the capacity of a specific habitat to support a particular species in existing conditions (Theuerkauf and Lipcius, 2016).

Pakistan is blessed with a variety of vegetation, climatic conditions and endemic species and classified among the countries that support more than 400 migratory bird species per year (Galbraith, 2014). Kohistan meaning “The Land of Mountains”, in Khyber Pakhtunkhwa province of Pakistan is having the most diverse geomorphic mountainous terrains, as it is located in an area where the Eurasian land plate and Indian subcontinent collide (Food and Agriculture Organization, 2017). The current research was focused on avian species distribution in eleven habitats of the study area, which are defined on the basis of land cover which is extracted from Pakistan Forest Institute “Land Cover Atlas of Pakistan” (Bukhari et al., 2012) and to study the habitat suitability of threatened species in the area.

MATERIALS AND METHODS

Study area

The study area extends from Raikot Bridge to Thakot Bridge downstream of River Indus in Gilgit Baltistan (GB) and KP province of Pakistan. The study was primarily focused along the River Indus and Karakoram Highway (KKH) along with associated valleys with elevation range of 871 to 3668m above sea level and it traverses district Diamer of Gilgit Baltistan and Kohistan and Shangla districts of Khyber Pakhtunkhwa. Geographically, the study area lies between 35.7551 N and 74.3826 E, and is very diverse in geomorphological terms. The annual mean temperature ranges from 2.15 to 18.55°C in different habitats of the study area. The range of precipitation is 344.94 to 922.12 mm while elevation varies from 871.99 to 3668.82 m.

Equipment

The equipment used for this study included GPS, binoculars, digital camera (Nikon p-900), spotting scope and field Guides of Roberts (1991, 1992); Mirza and Wasiq (2007) and Grimmett et al. (2008).

Survey method

Point count method (Verner, 1985) was used to observe species in different habitats of study area (Fig. 1). Around 330 survey points (thirty points from each habitat) were covered during the course of six months covering a total area of 11,407 km². The surveys were conducted mainly at dawn and dusk. All habitat types were covered in each visit and repeated sampling was done during the course of six months. At each point, we spent ten minutes for observation. Area of each habitat is given in Table I. During the survey, species name, time, count and location were recorded on the field data sheets.

In addition, targeted surveys were conducted for threatened species based on the known distribution areas available through literature. Western Tragopan Tragopan melanocephalus was of major concern, being a range-restricted species. Total 130 interviews were also conducted with regional wildlife department officials and local community to acquire information about different species.
Table I. Environmental parameters of each habitat.

| Sr. No. | Habitat                  | Area (km²) | Temperature (°C) | Precipitation (mm) | Elevation (m) |
|---------|--------------------------|------------|------------------|--------------------|---------------|
| 1       | Rangeland                | 3,700      | 9.91             | 531.55             | 464.53 - 4783.88 |
| 2       | Dry temperate            | 3,446      | 9.04             | 641.94             | 668.33 - 4213.61  |
| 3       | Shrubs and Bushes        | 1,596      | 10.48            | 721.47             | 504.26 - 4391.93  |
| 4       | Moist temperate          | 619        | 9.87             | 687.26             | 512.62 - 4120.36  |
| 5       | Alpine pasture           | 525        | 3.76             | 633.08             | 1542.27 - 4632.75 |
| 6       | Sub-tropical chir pine   | 501        | 12.98            | 922.12             | 566.35 - 3775.09  |
| 7       | Snow and glaciers        | 396        | 2.15             | 524.81             | 1935.27 - 4955.56 |
| 8       | Sub-tropical broad-leaved| 350        | 12.09            | 705.61             | 700.83 - 3806.62  |
| 9       | Agriculture land         | 175        | 13.49            | 544.94             | 566.43 - 3194.10  |
| 10      | Settlements              | 55         | 15.97            | 344.97             | 531.77 - 3773.23  |
| 11      | Water bodies             | 45         | 18.55            | 462.69             | 461.77 - 1279.13  |

The feeding habits of the species were acquired from available published literature and the species status and trends from official website of International Union for Conservation of Nature (IUCN).

Habitat types
For current study, eleven habitat types (Fig. 1) were selected after consulting Pakistan Forest Institute land use from Land Cover Atlas of Pakistan (Bukhari et al., 2012). These habitats include Agriculture Land, Alpine Pastures, Dry Temperate forests, Moist Temperate forests, Rangelands, Settlements, Shrubs and Bushes, Snow and Glaciers, Sub-tropical Broad-leaved forest, Sub-tropical Chir Pine forest and Water Bodies (see details in Supplementary Table SI).

Data analysis
Relative abundance (RA) was calculated by dividing number (count) of individual birds by total number of birds in the area.

Shannon wiener index (H') was calculated using the following formula.

\[ H' = \sum \frac{p_i}{n} \ln p_i \]

Where pi is the ratio of individual species count and total number of individuals observed in the area.

Habitat suitability index of threatened species was estimated using the following formula (Hess and Bey, 2000):

\[ HSI = \frac{SI_1 + SI_2 + SI_3 + \ldots + SI_n}{n} \]

The score ranged from 0 (least suitable) to 1 (highly suitable). Further categorization of the score is given in Table II. Different parameters were selected for each species to calculate the index. Parameters for Steppe Eagle included cultivated land, presence of lake/wetland, food availability, vegetation cover, presence of scattered trees/grassland, disturbances, geographic location and presence of breeding sites. On the other hand, for Western Tragopan the variables included, influence of human population, water availability, food availability, vegetation cover, hunting pressure, habitat fragmentation, disturbance and presence of breeding sites. The weightage for each parameter was assigned based on sightings, filed observations, species biology and wildlife experts’ opinion (Mölten et al., 1999).

Table II. Habitat suitability index score categorization.

| Category     | HSI score | Suitability    |
|--------------|-----------|----------------|
| Poor         | < 0.50    | Least suitable |
| Below average| 0.50 - 0.59|                |
| Average      | 0.60 - 0.69| Less suitable  |
| Good         | 0.70 - 0.79| Moderately suitable |
| Excellent    | > 0.8     | Highly suitable|

RESULTS
A total of 24,933 individuals of 175 species (Supplementary Table SII) were observed in the study area belonging to 16 orders (Fig. 2) and 55 families. Species richness was maximum (106) in settlements followed by agriculture land (Fig. 3). Maximum abundance was observed in rangelands (4,387/24,933, 17.59%) followed by settlements (4,357/24,933, 17.47%) while least number of individuals were observed in snow and glaciers (21/24,933, 0.08%). The bird abundance in descending order is given as: rangeland > settlements > agriculture land > dry temperate > moist temperate > alpine pasture > sub-tropical broad-leaved > shrubs and bushes > sub-tropical chir pine > water bodies > snow and glaciers. The
details of environmental parameters such as elevation, temperature and precipitation of each habitat are provided in Table I. The most abundant species in the study area were common myna Acridotheres tristis (RA=8.599), carrion crow Corvus corone (7.486), large-billed crow Corvus macrorhynchos (6.240), Himalayan bulbul or white-cheeked bulbul Pycnonotus leucogenys (5.905) and red-vented bulbul Pycnonotus cafer (5.801). Dry temperate had the highest species diversity values (H’=3.71) followed by settlements (H’=3.53) (Fig. 4). According to the current study, the area supports 71 summer breeders, 51 year-round resident, 35 winter migrants, 17 passage migrants while status of one species is unknown.

Different species have different vegetation preferences. Some species were found in more than one selected habitat while some species were found in only one habitat. Plumbeous water redstart Phoenicurus fuliginosus and red-vented bulbul were common in ten habitats while four species were common in nine habitats that included common myna, grey wagtail Motacilla alba and Yellow-billed Blue Magpie Urocissa flavirostris. Forty-three species were recorded in only one habitat (Supplementary Table SII).

The foraging habits of birds were assessed to find the variation in avifauna composition in various habitat types. Among five feeding habits assessed in the study, insectivorous species were the most abundant specially in settlements followed by agriculture land. Out of total, 50% species were insectivorous while 20% species were granivorous followed by 14% carnivorous. Only 10% species were omnivorous while only 6% frugivorous species were found in the study area.

The abundance and number of species varied with reference to habitat, because food availability and diversity changed with habitat. Distribution of species on the basis of food habits is provided in Table III.

According to the IUCN Red list, 168 species are least concern while five species are near threatened and two are endangered. Among threatened species, Western Tragopan is categorized as vulnerable and steppe eagle is endangered. The habitat suitability index was also estimated for these two species. During the study, Steppe eagle was observed in six habitats including agriculture land, moist temperate, rangeland, settlements, shrubs and bushes and sub-tropical broad leaved forest. Rangeland was estimated to be highly suitable with value 0.82 followed by agriculture land (0.78, suitable) and shrubs and bushes (0.61, less suitable). Settlements was the least suitable habitat while sub-tropical broad-leaved and moist temperate fell under the “poor” category with score 0.48 and 0.45, respectively.

Western tragopan is a range-restricted species and it was found only in one habitat (moist temperate). The HSI was estimated to be 0.70 suggesting that the habitat was moderately suitable for the species.
carrion crow, large-billed crow and Himalayan bulbul. These species were also reported by Roberts (1992) in the study area. Aforementioned species were found in all habitats due to their stability in various habitats and these must survive the changes in the habitat (Goerck, 1997). It has also been observed that structure of vegetation impacts the species diversity and there is positive correlation between species diversity, richness and vegetation structure (Lewis and Starrzomski, 2015). Fluctuation in species richness and decrease in number of individuals can be due to threat of predation, lower heterogeneity or diversity of habitat and absence of adequate foraging trees (Shochat et al., 2010; Pennington and Blair, 2011). According to McWethy et al. (2009) and Correia et al. (2020), bird abundance can also decrease due to canopy cover in forests.

Insectivorous birds were the most abundant especially in agriculture land, as birds play an important role as predators of insect pests in agriculture land as natural helpers of farmers (Jedlicka et al., 2011; Barbaro et al., 2012; Kross et al., 2016). In accordance with the current study, Girma et al. (2017) have also observed that maximum abundance of granivores was also found in agriculture land. The habitat provided vegetation cover for breeding, foraging and resting for different avian species. Inputs or intensification by the workers maintaining the agriculture landscape can also cause an increase in bird richness and diversity in forest areas (Kremen and Miles, 2012; Tuck et al., 2014).

Alpine pastures are found at relatively higher elevation i.e., above tree-line, support diverse vegetation and invertebrate species providing the food for mammals, reptiles and birds. Western tragopan was also observed in the study area by Raja et al. (1999) according to IUCN red list (IUCN, 2018). These pheasants were found in internationally recognized biodiversity hotspot in the study area i.e., Palas valley, which is also an important bird area. This species is restricted range (Grimmett et al., 2008) and such species are more likely to get extinct due to loss of respective habitats (McKinney, 1997). The habitat suitability index of western tragopan was estimated to be 0.70 and the major factors that caused decline in HSI were habitat loss and hunting pressure.

Rangelands supported a great number of individuals because of its temperature and habitat conditions for various plant, animal, reptile and invertebrate species making the area appropriate for bird foraging, resting and breeding (Warren and Baines, 2004; Krausman et al., 2009). Shrub and bushes provided foraging, breeding and resting habitat for avian species and suggested that these could also serve as important foraging habitats (Stevenson and Fanshawe, 2004). Steppe eagle is a globally endangered species.

### DISCUSSION

Determining the relationship among various habitats and avian diversity is a very important aspect of research. Among the selected habitats, maximum number of species were recorded in human settlements. Gatesire et al. (2014) also recorded maximum number of species in informal settlements in Northern Rwanda. The presence of maximum species in a habitat depends on variety of factors, primarily food availability, shelter or security and nesting-space. Settlements provide abundant food and more scavenging opportunities (Girma et al., 2017).

In the study area, agriculture land also supports many resident and migratory birds. High abundance of birds in agriculture landscape has also been observed in other studies (Muñoz-Sáez et al., 2017). Topographic variability along with geomorphological variation of the habitats can be a significant factor for variability in species richness and diversity in different habitats (McCain, 2009). Also, diversity in grazing-patterns in different habitats is one of the factors in varying species richness (Benton et al., 2003).

Results showed that rangelands supported maximum number of individuals while snow and glaciers supported the least number of individuals. The reason of the least number being the small proportion of snow and glaciers terrain within the overall study area as compared to other habitats. Change in vegetation and urban developments impact the species richness and diversity causing threat to some species (Lerman et al., 2014; Tu et al., 2020). The most abundant species of study area were common myna, bobwhite quail, white-bellied drongo, grey crows, black drongo, large-billed crow and Himalayan bulbul. These species were also reported by Roberts (1992) in the study area. Aforementioned species were found in all habitats due to their stability in various habitats and these must survive the changes in the habitat (Goerck, 1997). It has also been observed that structure of vegetation impacts the species diversity and there is positive correlation between species diversity, richness and vegetation structure (Lewis and Starrzomski, 2015). Fluctuation in species richness and decrease in number of individuals can be due to threat of predation, lower heterogeneity or diversity of habitat and absence of adequate foraging trees (Shochat et al., 2010; Pennington and Blair, 2011). According to McWethy et al. (2009) and Correia et al. (2020), bird abundance can also decrease due to canopy cover in forests.

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### Table III. Species distribution on the basis of food habit in different land use types.

| Habitat             | Carnivore | Frugivore | Granivore | Insectivore | Omni-vore |
|---------------------|-----------|-----------|-----------|-------------|-----------|
| Agriculture land    | 13        | 5         | 20        | 54          | 11        |
| Alpine pasture      | 4         | 1         | 10        | 29          | 5         |
| Dry temperate       | 9         | 5         | 15        | 50          | 11        |
| Moist temperate     | 12        | 4         | 21        | 51          | 10        |
| Rangeland           | 9         | 5         | 17        | 50          | 8         |
| Settlements         | 12        | 4         | 19        | 57          | 14        |
| Shrub and bushes    | 7         | 2         | 11        | 22          | 6         |
| Snow and Glaciers   | 0         | 0         | 1         | 2           | 0         |
| Sub-tropical broad-leaved | 3       | 1         | 2         | 8           | 3         |
| Sub-tropical chir pine | 0     | 1         | 1         | 1           | 2         |
| Water bodies        | 6         | 3         | 3         | 25          | 4         |
(IUCN, 2018) found also in the two aforementioned habitats because of their varied vegetation height, sedges, forbs and grasses (Cody, 1968; Wiens, 1969; Fisher and Davis, 2010).

Although steppe eagle was found in six habitats but only one habitat (rangeland) fell under the category of highly suitable as per HSI score. The species prefers the habitat with scattered trees, open country, bare lands and feeds on lizards, insects etc., (Roberts, 1991). As compared to other habitats Rangelands fulfill most of these requirements. The major factor that may decrease the HSI score of this habitat would be reduction in breeding sites and increase in disturbance.

Moreover, Water bodies was one of the main habitats of the study area that provided food for various insectivorous and carnivorous species (Masifwa et al., 2001; Meerhoff et al., 2003; Toft et al., 2003). Information about relationship of bird abundance and their association with habitat based on habitat preference is lacking in previous studies (Rajpar and Zakaria, 2011). However, studies have provided the linkage of species distribution with water bodies (Brown and Dinsmore, 1986). It was noticed that the structure of habitat and its vegetation is the key determinant of habitat selection for birds (Lancaster et al., 1979; Lee and Rotenberry, 2005). Birds associated with water bodies have adapted to specific vegetation structure and composition that also influences the species diversity and richness of specific habitat (Rajpar and Zakaria, 2011).

CONCLUSIONS

In conclusion, the study area is diversity rich and efforts are needed to explore it further. Species vary in different habitats based on their specific requirements for food, shelter, breeding grounds etc. It is important to conserve their natural habitat for species conservation.

RECOMMENDATIONS

The following recommendations have been devised for threatened species on the basis of extensive baseline surveys of the study area and the species ecology.

Western Tragopan is a range restricted species and there must be law enforcement to reduce the habitat destruction and illegal hunting. This species is very shy and for that matter, it is important to minimize the disturbance in its core habitat and awareness campaigns may be an initiative.

Steppe eagle was found in six habitats; the species became endangered mainly because of reduced breeding sites and habitat fragmentation. The safety of breeding sites must be ensured by officials of wildlife department and through community awareness campaign because the community is not aware of this species and its significance.

Supplementary material

There is supplementary material associated with this article. Access the material online at: https://dx.doi.org/10.17582/journal.pjz/20220224070218

Statement of conflict of interest

The authors have declared no conflict of interest.

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Supplementary Material

Avian Diversity, Abundance and Habitat Suitability Index for Threatened Species in Selected Areas of Northern Pakistan

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Supplementary Table SI. Description of habitat types.

| Sr. # | Habitat type       | Description                                                                                                                                                                                                 |
|-------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Alpine pastures   | Alpine Pastures are located in Northern areas of Pakistan such as, Hazara and Malakand division, Diamer district, GB. These comprised of alpine meadows at around ‘1542.27’ to ‘4632.75’ masl with vegetation of one to three meter and dense cover. Alpine Pastures were found above the tree line and these are grazing lands of various mammals specifically Markhor. |
| 2     | Dry temperate forests | Dry Temperate Forests contained bare soil (except of availability of extra moisture). Xerophytic vegetation is found in the area with grayish foliage having aromatic shrubs and small leaves. The dominating vegetation was Artemisia and the root system of the vegetation found in this habitat was quite extensive. Mostly small grasses and forbs were part of this habitat along with some climbers. |
| 3     | Moist temperate forest | Moist temperate forest was found in Palas valley and some other valleys with ‘1,500’ to ‘3,000’ m elevation. It contains gentle slopes and deep soil in the Northern aspect.                                      |
| 4     | Sub-tropical chir pine | Sub-tropical Chir Pine were often without shrub layer and found between 800 and ‘1,700’ m elevation in Western Himalayas. Thakot Bridge, Allai Khwar, Khan Khwar and Chakki harbor this type of habitat. |
| 5     | Sub-tropical broad-leaved | Sub-tropical Broad-Leaved forest types were found in Thakot, Nandihar Khwar and Allai Khwar.                                                                                                               |
| 6     | Agriculture land | Agriculture Land was the one used for crop cultivation.                                                                                                                                                      |
| 7     | Shrub and bushes  | Shrubs and Bushes were the woody plant habitat with low height (less than 3 m tall). They are recognized by various stems arising from the same stem.                                                            |
| 8     | Rangelands        | Rangelands contained natural/native vegetation of herbs and grasses mainly utilized for grazing by livestock and wild animals.                                                                               |
| 9     | Snow and glaciers | Snow and Glaciers are found at the higher altitudes of Western Himalayas and 70-80% of water is coming from the aforementioned habitat to Indus Delta.                                                         |
| 10    | Settlements       | Settlements are assemblages of dwellings making a community or where a communal society is residing.                                                                                                         |
| 11    | Water bodies      | Water bodies included nullahs, lakes or river in the area.                                                                                                                                                   |

Supplementary Table SII. Distribution of species in various habitats.

| S. # | Species                        | Feeding Habit* | IUCN Status** | Occurrence*** | Total no. of Individuals | No. of Common Habitats |
|------|--------------------------------|----------------|---------------|---------------|--------------------------|------------------------|
|      | Common name (Scientific name)  | G              | LC            | WM            | 9                        | 3                      | 3 | 2 | 4 |
| 1    | Alpine accentor (Prunella collaris) |                |               |               |                          |                        |              |               |               |               |               |
| 2    | Alpine swift (Tachymarptis melba) | I              | LC            | SB            | 290                      | 7                      | 47 | 127 | 29 | 5 | 39 | 21 | 22 |
| 3    | Ashy drongo (Dicrurus leucophaeus) | I              | LC            | SB            | 10                       | 2                      | 7              |               |               |               |               |               |               |
| 4    | Asian house martin (Delichon dasypus) | I              | LC            | SB            | 44                       | 4                      | 26             | 7              | 10 | 1 |
| 5    | Asian-barred Owlet (Glaucidium cuculoides) | I              | LC            | YRR           | 5                        | 3                      | 1              | 1              |               |               |               |               |               |               |
| 6    | Baillon’s crake (Porzana pusilla) | I              | LC            | WM            | 6                        | 2                      | 2              |               |               |               |               |               |               |               |
| 7    | Bank myna (Acridotheres gingenianus) | O              | LC            | YRR           | 47                       | 5                      | 12             | 27            | 4 | 3 | 1 |

Table continue on next page....................
| S. # | Species | Feeding Habit | IUCN Status | Total no. of Individuals | No. of Common Habitats | Agriculture | Land | Alpine | Arid | Desert | Dry Temperate | Moist | Rainforest | Settlements | Shoals and Rivers | Snow and Glaciers | Sub-Tropical | Chir Pine | Water Bodies |
|------|---------|---------------|-------------|--------------------------|------------------------|--------------|------|--------|-----|--------|-------------|-------|------------|------------|------------------|------------------|-------------|-----------|-----------|
| 9    | Bar-tailed Treecreeper (Certhia himalayana) | I | LC | WM | 103 | 3 | 25 | 67 | 11 |
| 10   | Black crested tit (Periparus melanolophus) | I | LC | YRR | 66 | 5 | 7 | 12 | 1 | 3 | 43 |
| 11   | Black drongo (Dicrurus macrocercus) | I | LC | SB | 155 | 7 | 89 | 10 | 11 | 3 | 18 | 23 | 1 |
| 12   | Black kite (Milvus migrans) | C | LC | YRR | 63 | 7 | 31 | 3 | 6 | 5 | 12 | 5 | 1 |
| 13   | Black redstart (Phoenicurus ochruros) | I | LC | WM | 91 | 7 | 12 | 4 | 43 | 6 | 9 | 13 | 4 |
| 14   | Black stork (Ciconia nigra) | C | LC | PM | 4 | 1 | 1 |
| 15   | Black winged cuckoo-shrike (Coracina melaschistos) | I | LC | SB | 1 | 1 | 1 |
| 16   | Black-crowned night heron (Nycticorax nycticorax) | C | LC | SB | 16 | 2 | | 4 | 12 |
| 17   | Black-shouldered kite (Elanus caeruleus) | C | LC | SB | 1 | 1 | | 1 |
| 18   | Black-throated tit (Aegithalos concinnus) | I | LC | SB | 35 | 3 | | 1 | 9 | 25 |
| 19   | Blue capped rock thrush (Monticola cinclorhynchus) | I | LC | SB | 180 | 6 | 12 | 7 | 14 | 12 | 13 | 122 |
| 20   | Blue rock thrush (Monticola solitarius) | I | LC | SB | 24 | 2 | | 7 | 17 |
| 21   | Blue whistling thrush (Myiopron caeruleus) | I | LC | SB | 535 | 8 | 75 | 10 | 67 | 24 | 195 | 187 | 7 |
| 22   | Blunt-winged warbler (Acrocephalus concinnus) | I | LC | SB | 8 | 2 | | 1 | 7 |
| 23   | Blyth's reed warbler (Acrocephalus dumentorum) | I | LC | PM | 13 | 2 | 12 | | 7 |
| 24   | Booted eagle (Hieraaetus pennatus) | C | LC | YRR | 10 | 2 | | 9 | 1 |
| 25   | Brahminy starling (Sturnia pagodarum) | I | LC | YRR | 283 | 6 | | 1 | 143 | 11 | 16 | 68 | 14 |
| 26   | Brook's leaf warbler (Phylloscopus subviridis) | I | LC | SB | 41 | 6 | 5 | 6 | 24 | 1 | 2 | 3 |
| 27   | Brown dipper (Cinclus pallasii) | I | LC | YRR | 354 | 7 | 67 | 111 | 67 | 17 | 78 | 1 | 13 |
| 28   | Brown rock chat (Cercomela fusca) | I | LC | SB | 32 | 4 | 5 | 7 | 11 | 9 |
| 29   | Brown-fronted woodpecker (Dendrocopos auriceps) | O | LC | SB | 5 | 1 | | 5 |

Table continue on next page.................
| S. # | Species | Common name (Scientific name) | Feeding Habit | IUCN Status | Occurrence | Total no. of Habitats | No. of Common Habitats | Water Bodies |
|------|---------|--------------------------------|---------------|-------------|------------|----------------------|-----------------------|--------------|
| 31   | Caspian tern | (Sterna capsica) | C               | LC          | PM         | 38                    | 3                     | 2            |              |
| 32   | Chestnut thrush | (Turdus rubrocanus) | I               | LC          | YRR        | 56                    | 6                     | 15           | 8            |
| 33   | Chukar | (Alectoris chukar) | I               | LC          | YRR        | 100                   | 5                     | 27           | 17           |
| 34   | Cinereous vulture | (Aegypius monachus) | C               | NT          | WM         | 2                     | 1                     |              |              |
| 35   | Citerine wagtail | (Motacilla citreola) | I               | LC          | SB         | 38                    | 7                     | 2            | 21           |
| 36   | Collared owlet | (Glaucidium brodici) | C               | LC          | SB         | 5                     | 2                     |              |              |
| 37   | Common buzzard | (Buteo bateo) | C               | LC          | WM         | 11                    | 4                     | 3            |              |
| 38   | Common chiffchaff | (Phylloscopus collybita) | I               | LC          | WM         | 71                    | 7                     | 12           | 14           |
| 39   | Common hoopoe | (Upupa epona) | I               | LC          | SB         | 44                    | 6                     |              |              |
| 40   | Common house-martin | (Delichon urbicum) | I               | LC          | SB         | 20                    | 2                     |              |              |
| 41   | Common kestrel | (Falco tinnunculus) | C               | LC          | WM         | 7                     | 4                     |              |              |
| 42   | Common myna | (Acridotheres tristis) | O               | LC          | YRR        | 2309                  | 10                    | 813          | 678          |
| 43   | Common ringed plover | (Charadrius hiaticula) | O               | LC          | WM         | 3                     | 1                     |              |              |
| 44   | Common rosefinch | (Carpodacus erythrinus) | O               | LC          | SB         | 8                     | 1                     |              |              |
| 45   | Common sandpiper | (Actitis hypoleucos) | I               | LC          | WM         | 231                   | 7                     | 73           | 39           |
| 46   | Common starling | (Sturnus vulgaris) | O               | LC          | WM         | 125                   | 5                     |              |              |
| 47   | Common stonechat | (Saxicola torquata) | I               | LC          | SB         | 26                    | 3                     | 3            | 12           |
| 48   | Common swift | (Apus apus) | I               | LC          | SB         | 30                    | 2                     |              |              |
| 49   | Common tailor bird | (Orthotomus sutorius) | I               | LC          | SB         | 9                     | 4                     |              |              |
| 50   | Crested bunting | (Melophas lathami) | G               | LC          | SB         | 10                    | 2                     |              |              |
| 51   | Crested lark | (Galerida cristata) | O               | LC          | YRR        | 675                   | 9                     | 64           | 89           |

Table continue on next page ..................
### Avian Diversity and Abundance in Northern Pakistan

| S. # | Species (Scientific name) | Feeding Habit | IUCN Status* | Occurrence*** | No. of Individuals | No. of Common Habitats | Water Bodies |
|------|--------------------------|---------------|--------------|---------------|-------------------|-----------------------|-------------|
| 53   | Eurasian blackbird (Turdus merula) | G LC YRR | 2 | 1 | 2 |
| 54   | Eurasian collared dove (Streptopelia decaocto) | G LC SB | 44 | 4 | 16 | 4 | 9 | 15 |
| 55   | Eurasian coot (Fulica atra) | O LC WM | 22 | 2 | 12 |
| 56   | Eurasian crag martin (Pyonoprogne rupestris) | I LC SB | 5 | 2 | 4 | 1 |
| 57   | Eurasian curlew (Numenis arquata) | O NT SB | 7 | 1 | 7 |
| 58   | Eurasian golden oriole (Oriolus oriolus) | G LC SB | 3 | 1 | 3 |
| 59   | Eurasian hobby (Falco subbuteo) | I LC SB | 30 | 5 | 13 | 11 | 2 | 4 |
| 60   | Eurasian magpie (Pica pica) | O LC SB | 36 | 4 | 11 | 8 | 17 |
| 61   | Eurasian nightjar (Caprimulgus europaeus) | I LC SB | 4 | 1 | 4 |
| 62   | Eurasian skylark (Alauda arvensis) | G LC WM | 61 | 6 | 11 | 1 | 9 | 1 | 13 | 26 |
| 63   | Eurasian sparrowhawk (Accipiter nisus) | C LC SB | 75 | 3 | 3 | 29 | 43 |
| 64   | Eurasian tree sparrow (Passer montanus) | G LC YRR | 390 | 7 | 29 | 5 | 54 | 1 | 87 | 198 | 16 |
| 65   | Eurasian tree creeper (Certhia familiaris) | I LC YRR | 5 | 1 | 5 |
| 66   | European Bee-eater (Merops apiaster) | I LC SB | 29 | 4 | 3 | 5 | 17 | 4 |
| 67   | European goldfinch (Carduelis carduelis) | G LC WM | 83 | 6 | 3 | 54 | 9 | 4 | 6 | 7 |
| 68   | European roller (Coracias garrulus) | I LC PM | 45 | 6 | 9 | 11 | 2 | 10 | 13 |
| 69   | Golden eagle (Aquila chrysaetos) | C LC YRR | 28 | 6 | 17 | 1 | 3 | 1 | 4 | 2 |
| 70   | Great crested flycatcher (Myiarchus crinitus) | I LC Un- known | 13 | 2 | 2 | 11 |
| 71   | Great crested grebe (Podiceps cristatus) | C LC WM | 6 | 2 | 1 | 4 | 2 |
| 72   | Great rosefinch (Carpodacus rubicilla) | G LC WM | 3 | 1 | 3 |
| 73   | Great tit (Parus major) | I LC WM | 79 | 8 | 27 | 21 | 14 | 10 | 1 | 3 | 3 |

*Table continue on next page...
| S. # | Species Common name (Scientific name) | Feeding Habit | IUCN Status* | Occurrence** | Total no. of Individuals | No. of Common Habitats | Habits |
|------|----------------------------------------|---------------|--------------|--------------|--------------------------|------------------------|--------|
|      |                                        |               |              |              |                          |                        |        |
|      |                                        |               |              |              |                          |                        |        |
| 75   | Greater Short-toed lark (<i>Calandrella brachydactyla</i>) | G             | LC           | PM           | 24                       | 3                      | 5      | 14 | 5  |
| 76   | Green bee-eater (<i>Merops orientalis</i>) | I             | LC           | SB           | 19                       | 2                      | 11     | 8  |
| 77   | Green sand piper (<i>Tringa ochropus</i>) | I             | LC           | WM           | 6                        | 2                      | 3      |    |
| 78   | Green shank (<i>Tringa nebularia</i>) | C             | LC           | WM           | 9                        | 1                      |        |    |
| 79   | Green shrike-babbler (<i>Pteruthius xanthochlorus</i>) | G             | LC           | SB           | 1                        | 1                      |        |    |
| 80   | Greenish warbler (<i>Phylloscopus trochiloides</i>) | I             | LC           | WM           | 53                       | 6                      | 23     | 4  | 2  |
| 81   | Grey breastined prinia (<i>Prinia hodgsonii</i>) | I             | LC           | YRR          | 10                       | 2                      | 7      | 3  |
| 82   | Grey bushchat (<i>Saxicola ferreus</i>) | G             | LC           | SB           | 31                       | 4                      | 3       | 6  | 13 | 9  |
| 83   | Grey wagtail (<i>Motacilla cinerea</i>) | I             | LC           | SB           | 1005                     | 10                     | 132     | 98 | 67 | 186 | 265 | 126 | 91 | 26 | 14 |
| 84   | Hen harrier (<i>Circus cyaneus</i>) | C             | LC           | WM           | 40                       | 6                      | 3       | 1  | 22 | 11 | 2  | 1  |
| 85   | Himalayan bulbul (<i>Pycnonotus leucogenys</i>) | G             | LC           | YRR          | 1711                     | 8                      | 198     | 176 | 131 | 164 | 556 | 381 | 105 |
| 86   | Himalayan griffon (<i>Gyps himalayensis</i>) | C             | NT           | YRR          | 59                       | 7                      | 7       | 14 | 10 | 10 | 8  | 9  |
| 87   | Himalayan woodpecker (<i>Dendrocopos himalayensis</i>) | I             | LC           | YRR          | 43                       | 3                      | 15      | 1  |    |    |    | 27 |
| 88   | House crow (<i>Corvus splendens</i>) | O             | LC           | YRR          | 981                      | 9                      | 402     | 16  | 25 | 75  | 98  | 208 | 117 |    | 40 |
| 89   | House sparrow (<i>Passer domesticus</i>) | G             | LC           | SB           | 556                      | 8                      | 111     | 15  | 115 | 5   | 57  | 145 | 101 |    | 7  |
| 90   | Hume's lark (<i>Calandrella acutirostris</i>) | G             | LC           | SB           | 19                       | 1                      | 19      |    |    |    |    |    |    |    |    |
| 91   | Hume's warbler (<i>Phylloscopus humei</i>) | I             | LC           | SB           | 14                       | 2                      | 8       |    |    |    |    |    |    |    |    |
| 92   | Hume's wheatear (<i>Oenanthe albonigra</i>) | I             | LC           | YRR          | 260                      | 7                      | 28      | 98  | 115 | 9   | 7   | 3   |
| 93   | Indian Paradise-flycatcher (<i>Terpsiphone paradisi</i>) | I             | LC           | SB           | 50                       | 5                      | 9       |    |    |    |    | 11  | 5   | 12 | 13 |
| 94   | Indian robin (<i>Saxicolaoides fulicata</i>) | I             | LC           | YRR          | 5                        | 4                      | 1       |    |    |    |    | 1   | 2   | 1  |    |
| 95   | Indian roller (<i>Coracias benghalensis</i>) | I             | LC           | SB           | 101                      | 6                      | 34      |    |    |    |    | 19  | 8   | 13 | 21 | 6  |    |    |

Table continue on next page.....................
| S. # | Species                              | Common name (Scientific name) | Feeding Habit | IUCN Status | Occurrence | Total no. of Individuals | No. of Common Habitats | HABITATS | Aquatorial | Boreal | Alpine | Sub-alpine | Sub-Arid | Tropical | Chir Pine | Snow and Glaciers | Sub-Tropical | Broad-leaved | Sub-Tropical | Chaparral | Shrub and Bushes | Water Bodies |
|------|-------------------------------------|------------------------------|---------------|-------------|------------|--------------------------|------------------------|-----------|------------|--------|--------|-----------|---------|----------|----------|-----------------|-------------|---------------|--------------|------------|-----------------|------------|
| 97   | Koklas pheasant                     | (Pucrasia macrolopa)         | G             | LC          | YRR        | 1                         | 1                      |           |            |        |        |           |         |          |           |                 |              |               |              |            |                 |            |
| 98   | Large billed crow                   | (Corvus macrorhynchos)       | O             | LC          | YRR        | 1839                     | 9                      | 357       | 11         | 418    | 124    | 432       | 373     | 6        |           | 118             |              |               |              |            |                 |            |
| 99   | Laughing dove                       | (Streptopelia senegalensis)  | G             | LC          | SB         | 186                      | 8                      | 54        | 16         | 25     | 41     | 24        | 11      | 15       |           |                 |              |               |              |            |                 |            |
| 100  | Lesser sand-plover                  | (Charadrius mongolus)        | I             | LC          | SB         | 10                        | 2                      | 9          |            |        |        |           |         |          |           |                 |              |               |              |            |                 |            |
| 101  | Lesser whitethroat                 | (Sylvia curruca)             | I             | LC          | SB         | 166                      | 5                      | 65        | 81         | 5      | 8      | 7         |         |          |           |                 |              |               |              |            |                 |            |
| 102  | Little crane                        | (Porzana parva)              | G             | LC          | WM         | 7                        | 3                      | 1          | 5          |        |        | 1         |         |          |           |                 |              |               |              |            |                 |            |
| 103  | Little Forktail                    | (Enicurus scouler)           | I             | LC          | YRR        | 253                      | 7                      | 41         | 17         | 46     | 7      | 28        | 97      |          |           |                 |              |               |              |            |                 |            |
| 104  | Little ringed plover               | (Charadrius dubius)          | I             | LC          | WM         | 1                        | 1                      | 1          |            |        |        |           |         |          |           |                 |              |               |              |            |                 |            |
| 105  | Little stint                        | (Calidris minutia)           | I             | LC          | PM         | 26                       | 4                      | 6          |            |        |        | 3         | 9       |          |           |                 |              |               |              |            |                 |            |
| 106  | Little swift                       | (Apus affinis)               | I             | LC          | SB         | 29                       | 2                      | 21         |            |        |        | 8         |         |          |           |                 |              |               |              |            |                 |            |
| 107  | Long billed pipit                  | (Anthus similis)             | G             | LC          | YRR        | 15                       | 6                      | 1          | 3          | 1      | 1      | 7         |         |          |           |                 |              |               |              |            |                 |            |
| 108  | Long-legged Buzzard                | (Buteo rufinus)              | C             | LC          | WM         | 1                        | 1                      |            |           |        |        | 1         |         |          |           |                 |              |               |              |            |                 |            |
| 109  | Long-tailed minivet                | (Pericrocotus etholous)      | I             | LC          | SB         | 6                        | 1                      | 6          |            |        |        |           |         |          |           |                 |              |               |              |            |                 |            |
| 110  | Long-tailed shrike                 | (Lanius schach)              | I             | LC          | SB         | 116                      | 6                      | 31         | 21         | 5      | 25     | 3         | 31      |          |           |                 |              |               |              |            |                 |            |
| 111  | Marsh sandpiper                     | (Tringa stagnatilis)         | I             | LC          | WM         | 37                       | 2                      | 8          |            |        |        |           |         |          |           |                 |              |               |              |            |                 |            |
| 112  | Monal pheasant                      | (Lophophorus impejanus)      | G             | LC          | YRR        | 1                        | 1                      |            |           |        |        | 1         |         |          |           |                 |              |               |              |            |                 |            |
| 113  | Mountain chiffchaff                 | (Phylloscopus sindianus)     | I             | LC          | SB         | 17                       | 4                      | 3          |           |        |        | 4         | 5       | 5        |           |                 |              |               |              |            |                 |            |
| 114  | Northern goshawk                    | (Accipiter gentilis)         | C             | LC          | PM         | 1                        | 1                      |            |           |        |        | 1         |         |          |           |                 |              |               |              |            |                 |            |
| 115  | Oriental Magpie-robin               | (Copsychus saularis)         | I             | LC          | SB         | 1                        | 1                      | 1          |            |        |        |           |         |          |           |                 |              |               |              |            |                 |            |
| 116  | Oriental skylark                    | (Alauda gulgula)             | G             | LC          | SB         | 14                       | 1                      | 14         |            |        |        |           |         |          |           |                 |              |               |              |            |                 |            |
| 117  | Oriental white eye                  | (Zosterops palpebrosus)      | F             | LC          | YRR        | 7                        | 1                      | 7          |            |        |        |           |         |          |           |                 |              |               |              |            |                 |            |

Table continue on next page.................
| S. # | Species                        | Common name                  | Feeding Habit* | IUCN Status** | Occurrence*** | Total no. of Individuals | No. of Common Habitats | Habitats | Agriculture | Alpine | Arid | Deserts | Dry Temperate | Most | Mountain Range | Rangeland | Settlemnts | Shrubs and Bushes | Snow and Glaciers | Sub-Tropical | Sub-Tropical Chir Pine | Water Bodies|
|------|--------------------------------|------------------------------|----------------|---------------|---------------|--------------------------|------------------------|----------|-------------|--------|------|---------|--------------|------|----------------|-----------|------------|----------------|-----------------|-------------|----------------------|-----------|
| 119  | Pied bushchat                  | *Saxicola caprata*           | I              | LC            | SB            | 67                        | 6                      | 18       | 7           | 28     | 11   | 3       |               |      |                |           |            |                |                 |             |                      |           |
| 120  | Pied wheatear                  | *Oenanthe pleschanka*        | F              | LC            | PM            | 48                        | 3                      | 15       | 26          |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 121  | Plain mountain finch           | *Leucosticte nemoricola*     | G              | LC            | YRR           | 12                        | 1                      |          |             |        |      |         |               |      |                |          |            |                |                 |             |                      |           |
| 122  | Plumbeous water redstart       | *Phoenicurus fuliginosus*    | G              | LC            | SB            | 785                       | 11                     | 132      | 28          | 175    | 77   | 53       | 207           | 53   | 11             | 21        | 28         |                |                 |             |                      |           |
| 123  | Purple sunbird                 | *Cinnyris asiaticus*         | F              | LC            | SB            | 1                         | 1                      |          |             |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 124  | Raven                           | *Corvus corax*               | O              | NT            | YRR           | 120                       | 3                      | 23       | 11          | 86     |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 125  | Alpine thrush                  | *Zoothera mollissima*        | G              | LC            | YRR           | 3                         | 1                      |          |             |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 126  | Red crossbill                  | *Loxia curvirostra*          | G              | LC            | SB            | 15                        | 4                      | 7         | 1           |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 127  | Red fronted serin              | *Serinus pusillus*           | G              | LC            | YRR           | 2                         | 1                      |          |             |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 128  | Red shank                      | *Tringa tetanus*             | I              | LC            | PM            | 10                        | 1                      |          |             |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 129  | Red vented bulbul              | *Pycnonotus cafer*           | F              | LC            | YRR           | 1695                      | 11                     | 254      | 4           | 67     | 34   | 66       | 116           | 46   | 10             |           |            |                |                 |             |                      |           |
| 130  | Red-backed Shrike              | *Lanius collurio*            | C              | LC            | PM            | 6                         | 1                      |          |             |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 131  | Red-throated Pipit             | *Anthus cervinus*            | F              | LC            | PM            | 55                        | 5                      | 14       | 9           | 6      |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 132  | Red-throated Thrush            | *Turdus ruficollis*          | F              | LC            | WM            | 4                         | 1                      | 4         |             |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 133  | Red-wattled Lapwing            | *Vanellus indicus*           | I              | LC            | YRR           | 392                       | 3                      | 15       |             |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 134  | Rock bunting                   | *Emberiza cia*               | F              | LC            | SB            | 447                       | 6                      | 19       | 53          | 165    | 176  | 34       |               |      |                |           |            |                |                 |             |                      |           |
| 135  | Rock pigeon                    | *Columba livia*              | G              | LC            | YRR           | 178                       | 8                      | 21       | 17          | 43     | 43   | 29       | 21            | 4    |                |           |            |                |                 |             |                      |           |
| 136  | Rook                            | *Corvus frugilegus*          | O              | LC            | WM            | 12                        | 2                      | 4         | 8           |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 137  | Rose-ringed Parakeet           | *Psittacula krameria*        | G              | LC            | YRR           | 21                        | 2                      |          |             |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 138  | Rosy minivet                   | *Pericroco tusroeseus*       | I              | LC            | YRR           | 6                         | 1                      | 1         | 6           |        |      |         |               |      |                |           |            |                |                 |             |                      |           |
| 139  | Rosy pipit                     | *Anthus roseatus*            | G              | LC            | SB            | 4                         | 2                      | 1         | 3           |        |      |         |               |      |                |           |            |                |                 |             |                      |           |

Table continue on next page.................
| S. # | Species | Common name (Scientific name) | Feeding Habit* | IUCN Status** | Occurrence*** | Total no. of Individuals | No. of Common Habitats | Agriculture | Wetland | Rangeland | Temperate | Moist | Snow and Glaciers | Sub-Tropical | Broad-leaved | Sub-Tropical | Chir Pine | Water Bodies |
|------|---------|-------------------------------|----------------|---------------|--------------|------------------------|----------------------|-------------|---------|----------|---------|------|------------------|-------------|-------------|-------------|----------|-------------|
| 141  | Ruff    | Philomachus pugnax           | I              | LC            | PM           | 4                        | 1                    | 4           |         |          |         |      |                  |             |             |             |         |             |
| 142  | Rufous treepie | Dendrocitta vagabunda | O              | LC            | YRR          | 18                       | 5                    | 1           | 5        | 6         | 5       |      |                  |             |             |             |         |             |
| 143  | Rufous-naped tit | Parus rufonuchalis | G              | LC            | YRR          | 30                       | 4                    | 4           | 8        | 7         | 11      |      |                  |             |             |             |         |             |
| 144  | Russet sparrow | Passer rutilans          | G              | LC            | YRR          | 6                        | 2                    |            | 3        | 3         |         |      |                  |             |             |             |         |             |
| 145  | Shikra   | Accipiter badius            | C              | LC            | SB           | 13                       | 5                    | 6           | 2        | 1         | 1       | 3    |                  |             |             |             |         |             |
| 146  | Spanish sparrow | Passer hispaniolensis    | G              | LC            | PM           | 261                      | 7                    | 58          | 8        | 41        | 16      | 38  | 73               | 27          |             |             |         |             |
| 147  | Spotted crake | Porzana porzana          | I              | LC            | PM           | 15                       | 3                    | 3           | 6        |           |         |      |                  |             |             |             |         |             |
| 148  | Spotted dove | Streptopelia chinsenis   | G              | LC            | SB           | 18                       | 2                    | 5           |          |           |         |      |                  |             |             |             |         |             |
| 149  | Spotted red shank | Tringa erythropus     | I              | LC            | WM           | 12                       | 2                    | 5           |          |           |         |      |                  |             |             |             |         |             |
| 150  | Steppe eagle | Aquila nipalensis        | C              | EN            | WM           | 65                       | 7                    | 19          | 4        | 3         | 4       | 1    | 29               | 5           |             |             |         |             |
| 151  | Streaked laughing thrush | Trochalopteron lineatum | F              | LC            | YRR          | 219                      | 6                    | 37          | 17       | 16        | 145     | 4    |                  |             |             |             |         |             |
| 152  | Sulphur-bellied warbler | Phylloscopus griseolus | I              | LC            | SB           | 1                        | 1                    |             |          |           |         |      |                  |             |             |             |         |             |
| 153  | Tawny pipit | Anthus campestris        | F              | LC            | WM           | 11                       | 1                    |             |          |           |         |      |                  |             |             |             |         |             |
| 154  | Tickell's thrush | Turdus unicolor        | F              | LC            | SB           | 3                        | 1                    |             |          |           |         |      |                  |             |             |             |         |             |
| 155  | Ultramarine flycatcher | Ficedula superciliaris | I              | LC            | SB           | 33                       | 4                    | 17          | 6        | 9         | 1       |      |                  |             |             |             |         |             |
| 156  | Variable wheatear | Oenanthe picata       | I              | LC            | SB           | 284                      | 7                    | 18          | 104      | 14        | 116     | 19  | 13               |             |             |             |         |             |
| 157  | Wall creeper | Tichodroma muraria      | I              | LC            | WM           | 118                      | 7                    | 3           | 87       | 9         | 14      | 3   | 2                |             |             |             |         |             |
| 158  | Water rail | Rallus aquaticus        | O              | LC            | WM           | 32                       | 2                    | 5           | 2        |           |         |      |                  |             |             |             |         |             |
| 159  | Western tragopan | Tragopan melanocephalus | G              | VU            | YRR          | 1                        | 1                    |             |          |           |         |      |                  |             |             |             |         |             |
| 160  | Whistler's warbler | Seicercus (whistleri) | I              | LC            | SB           | 2                        | 1                    |             |          |           |         |      |                  |             |             |             |         |             |
| 161  | White throated kingfisher | Halcyon smyrnensis   | I              | LC            | YRR          | 18                       | 5                    | 3           | 4        | 5         | 2       |      |                  |             |             |             |         |             |

Table continue on next page..........................
| S. # | Species | Common name (Scientific name) | Feeding Habit* | IUCN Status** | Occurrence*** | Total no. of Individuals | No. of Common Habitats | Agriculture | Alpine | Sub-Tropical Chir Pine | Water Bodies |
|------|---------|--------------------------------|----------------|----------------|---------------|------------------------|----------------------|-------------|--------|------------------|-------------|
| 163  | White-bellied redstart | Hodgsonius phoenicuroides | F LC YRR | 9 3 | 1 7 | 1 |
| 164  | White-browed fantail | Rhipidura aureola | I LC SB | 83 2 | 76 7 | |
| 165  | White-browed wagtail | Motacilla maderaspatensis | I LC YRR | 114 7 | 27 18 5 | 21 19 | 23 1 |
| 166  | White-capped water redstart | Phoenicurus leucocephalus | I LC SB | 703 8 | 14 117 98 178 156 121 | |
| 167  | White-cheeked Tit | Aegithalos leucogenys | I LC YRR | 22 1 | 22 |
| 168  | White-throated dipper | Cinclus cinclus | I LC YRR | 367 5 | 233 6 5 | 123 |
| 169  | White-throated tit | Aegithalos niveogularis | I LC YRR | 91 7 | 9 5 19 12 13 24 9 |
| 170  | White-winged tern | Chlidonias leucopterus | C LC PM | 19 1 | 19 |
| 171  | Winter wren | Troglodytes hiemalis | I LC YRR | 2 2 | 1 1 |
| 172  | Wire-tailed swallow | Hirundo smithii | I LC SB | 130 8 | 42 4 43 12 | 13 15 1 |
| 173  | Yellow wagtail | Motacilla flava | I LC PM | 323 6 | 78 76 3 | 31 131 4 |
| 174  | Yellow-billed blue magpie | Urocissa flavirostris | O LC YRR | 108 10 | 23 7 39 10 | 1 12 13 2 1 |
| 175  | Yellow-eyed babbler | Chrysomma sinense | F LC SB | 1 1 | 1 |

* G, Granivore; I, Insectivore; C, Carnivore; F, Frugivore; O, Omnivore. ** LC, Least Concern; NT, Near Threatened; VU, Vulnerable; EN, Endangered. *** WM, Winter Migrant; SB, Summer Breeder; YRR, Year Round Resident; PM, Passage Migrant.