

Some Observations on Threatened and Near Threatened avifauna of Pakistan

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ABSTRACT

Sixteen Threatened and Near Threatened species of birds belonging to 12 families and sub-families and 8 orders were recorded at 50 different sites from December 2006 to January 2012 during studies conducted under Pakistan Wetlands Programme for baseline assessments and midwinter waterfowl census in Pakistan. Of the total recorded species, nine are Near Threatened, five Vulnerable, one Endangered and one Critically Endangered. Classification of birds on the basis of their occurrence and visit to the study area shows that of the total recorded species, four are resident; four are winter visitors; passage migrant and irregular year round visitors; three are winter visitors; two are resident; passage migrant and year round visitors; two are passage migrant and irregular year round visitors and one is resident and winter visitor. Similarly of total bird species, nine are omnivorous and seven are carnivorous. A brief account of each species and their sightings is given. Recommendations are made to conserve the population of these threatened bird species.

Introduction

The article gives the account of the Threatened and Near Threatened bird species observed during different studies conducted under Pakistan Wetlands Programme for baseline assessments and midwinter waterfowl count in Pakistan. These species can be considered as indicators of ecosystem health. The IUCN/SSC (1999) classifies threatened species as "all full species categorised at the global level as Critically Endangered, Endangered or Vulnerable". Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) taxa are considered to be facing an extremely high, very high, and high risk of extinction in the wild, respectively.

Threatened species lists are designed to set priorities for resource allocation for species recovery, to inform reserve system design, to constrain development and exploitation, and to report on the state of the environment (Possingham *et al.*, 2002). Moreover, in many countries, there is a direct connection between threatened species lists and legislation [e.g. the Convention on International Trade in Endangered Species (UNEP-WCMC, 1998) and the US Endangered Species Act], leading to political and social considerations in the listing protocol. Conserving populations of threatened species often derives and simplifies reserve system planning. For example, Ceballos *et al.*, (1998) and Noss (2000) recommend using threatened species lists as one of several factors identifying high-risk ecosystems. Given the social and legal importance of threatened species, protecting such species might take precedence over other criteria. In addition, a pragmatic view is that threatened species may serve best to attract public attention as well as funding (Williams *et al.*, 2000). A common presumption, shared by both global and national schemes for determining priority areas for conservation based on the occurrence of threatened species, will also prove appropriate to protect most of the other species within the target taxon (Bonn *et al.*, 2002).

In most countries, environmental impact processes evaluate the likelihood that development will affect any threatened species. Threatened species lists are one of the few tools at the disposal of regulatory agencies and the public to limit adverse environmental impacts of development. When a proposed development action is judged to increase risks to threatened species, that activity might be modified or postponed. If there is no evidence that listed

species are present, or impacts are negligible, development can proceed (Possingham *et al.*, 2002). Listing might increase threats to a species. When the presence of a threatened species in an area is viewed as an impediment to a particular land use, land managers might destroy habitat, deny the presence of the species or deny access to the area for researchers or government officials. This is an unintended consequence of a threatened species list when incentives for landowners to conserve threatened species on their properties are lacking (Possingham *et al.*, 2002).

Although simplifying complex problems makes sense, there is no biological justification for using threatened species alone as an umbrella group for all biodiversity (Possingham *et al.*, 2002). The use of threatened species as surrogates for biodiversity is limited, because most invertebrate animals and nonvascular plants do not appear on any threatened species lists. The use of single threatened species as umbrella species for biodiversity conservation is particularly problematic (Berger, 1997; Andelman and Fagan, 2000; Rubinoff, 2001).

The global population sizes of species vary by many orders of magnitude. Amongst the birds, the rarest presently numbers just a handful of wild individuals (BirdLife, 2000), whilst the most abundant (Elliott, 1989) has many hundreds of millions. Numerous reasons can be suggested for these differences, including the influences of body size, life history, trophic group, phylogeny and history (Damuth, 1981; Peters & Wassenberg, 1983; Pimm, 1991; Brown, 1995; Blackburn *et al.*, 1996; Gaston & Blackburn, 1996; 2000).

One obvious potential reason for the limited progress in explaining variation in the abundance of bird species has been the heavy emphasis placed on their intrinsic characteristics, rather than on differences in extrinsic factors, such as the environments that they occupy and the influence that human activities have had on their populations. Of course, it is generally understood that environments differ in the opportunities that they provide for birds, because of variation in their productivity, temporal and spatial stability, and geographical extent (Blackburn and Gaston, 2002). However, many, arguably perhaps most, macroecological comparative studies have failed to take explicit account of such issues. Likewise, it is evident that the vast majority of those species presently regarded as having a high risk of becoming extinct in the near future are listed as such

because of the negative impacts that human activities have had on their global populations, and that such impacts extend to a large number of species that are not as yet threatened (Tucker & Heath, 1994; Lawton & May, 1995; BirdLife, 2000). The disproportionate attention paid to the characteristics of species rather than extrinsic factors when considering their abundance is echoed in attempts to understand the covariates and determinants of high risks of extinction (Blackburn and Gaston, 2002).

The objective of the current study was to carry out surveys at significant wetlands in Pakistan to provide information about the current distribution and status of bird species in general and Threatened and Near Threatened bird species in particular in Pakistan to contribute to the conservation of wetlands. The rationale behind this approach was to increase the knowledge of Threatened and Near Threatened avifauna of Pakistan. The study provides an ornithological baseline data for significant wetlands in Pakistan where future population trends can be compared.

Material and Methods

A 10x42mm Olympus binocular, 20x45-60mm Nikon spotting scope, Garmin Map 76 Global Position System receiver, Birds of Pakistan by Grimmett *et al.*, (2008), Pocket guide to the "Birds of Indian Subcontinent" by Grimmett *et al.*, (1998) and "A field guide to the Birds of the Indian Subcontinent" by Kazmierczak (2000) were used in the field for identification. A 4x4 Land Cruiser was used for transport purposes, whereas hand floatable and Ray marine Rib boats were used to collect data from different habitats of the region.

Surveys were conducted at 50 significant wetlands in Pakistan from December 2006 to January 2012 (Fig. 1). Sites covered during the count include all types of natural and manmade wetlands, including rivers, lakes, reservoirs, freshwater swamps, mangroves, rice fields and lagoons. Water birds counted during the census included all types of water birds regularly encountered at wetlands, including grebes, cormorants, pelicans, herons, egrets, storks, ibises, spoonbills, flamingoes, ducks, geese, cranes, rails, jacanas, shorebirds, gulls and terns etc. In addition, raptors, kingfishers and other wetland dependent birds were also covered. The official dates for the Asian Waterbird Count are during the second and third week of January every year. Data were collected on prescribed data forms. Direct field observations were made on different observation points of different habitats to count and collect information about distribution and status of waterfowl in Pakistan. The line transect method was usually used where it was possible to move through the habitat or on the edges of the area. A distance of about 30 - 40 m on both sides of the tract was maintained in the line transect surveys. At the beginning of the transect count the starting point was marked with GPS. As transect proceeded, observed species were recorded. The finishing point was also marked at the end of observation.

Point counts were conducted for areas where a moving transect was not possible since the open ground made birds unapproachable, or for areas where movement was restricted i.e. water courses with low water level which restricted linear movement in a boat. At the beginning of the point survey, the location was noted with a GPS along with the viewing bearing (using a compass) and the starting time. Normally point count survey was conducted for thirty minutes when the species and their abundance in a particular habitat was noted. Usually the radius of the point counts was 100 m.

The occurrence of the species in the country, their feeding habits and major food items and nomenclature used in this paper is adopted from Roberts (1991; 1992). The International Union for Conservation of Nature (IUCN) status of the species for 2011.2 is adopted from IUCN website (IUCN, 2011). The data of the global population sizes of all the species (Annex 1) are adopted from BirdLife International website (Birdlife International, 2012).

Results and Discussion

During the study, 16 Threatened and Near Threatened species of birds belonging to 12 families and sub-families and 8 orders were recorded at 50 different sites all over Pakistan (Fig. 1; Annex 1). According to IUCN criteria (IUCN, 2011), of the total recorded species, nine are Near Threatened, five Vulnerable, one Endangered and one Critically Endangered (Fig. 2; Annex 1). Classification of birds on the basis of their occurrence and their visit to the study areas given in Roberts (1991) shows that of the total recorded species, four are resident; four are winter visitors; passage migrant and irregular year round visitors; three are winter visitors; two are resident; passage migrant and year round visitors; two are passage migrant and irregular year round visitors and one is resident and winter visitor (Fig. 3; Annex 1). Similarly, classification of birds on the basis of their feeding habits as recorded in Roberts (1991) shows that nine species are omnivorous and seven are carnivorous (Fig. 4; Annex 1).

Bird fauna of Pakistan is predominantly Palearctic, especially in the winter time with an influx of migrant species. A total of 668 bird species are recorded in Pakistan (Roberts, 1991;1992), of which 36.6 % can be considered to have Oriental affinities and 63.4 % to be Palearctic or Holarctic and less than 0.5 % can be considered as truly cosmopolitan or pan-sub-tropical (Roberts, 1991). There is an influx of winter visiting birds from northern breeding grounds, or summer breeding visitors both from the northern mountain regions and from the Indus Plains, to warmer more southern latitudes (Ali, 2005). Of the total 668 Pakistan's bird species, 30 % visit the country for a significant period of the year as long distance migrants, 43 % are either Palearctic species visiting Pakistan only for breeding and 28 % are regular winter visitors, which breed extra-limally and mainly in trans-Himalayan northern regions (Ali, 2005). About one-third of total 668 bird species in Pakistan use wetlands for food, shelter, and (or) breeding (Ali, 2005), however, the birds that visit or breed in poorer quality habitats will not contribute to a sustainable population through the years (Pulliam and Danielson, 1991).

A review of the individual status of bird species that are either wetlands dependent or associated with wetlands in Pakistan revealed that 25 bird species are of substantial economic importance and believed to need urgent attention of which nine bird species or subspecies are endangered or threatened (Khurshid, 2000; BirdLife, 2004; IUCN, 2011). In Pakistan wetlands related threatened species of birds that require priority action for conservation are, Siberian Crane *Grus leucogeranus*, Sarus Crane *Grus antigone*, Dalmatian Pelican *Pelicanus crispus*, Ferruginous Duck *Aythya nyroca*, White-headed Duck *Oxyura leucocephala*, Marbled Teal *Marmaronetta angustirostris*, Sociable Plover *Vanellus gregarius*, Jerdon's Moupinia or Sindh Babbler *Moupinia altirostris*, Lesser White-fronted Goose *Anser erythropus*, Long-tailed Grass Warbler *Prinia burnesii*, and Pallas Fish Eagle *Haliaeetus leucoryphus* (Khurshid, 2000).

The recent sightings of Threatened and Near Threatened bird species are significant in that these will help update the distribution of these species in Pakistan because there are many areas where the occurrence of these species is not mentioned in the past literature presented by Roberts (1991; 1992); Grimmett *et al.*, (1998); Kazmierczak (2000); Grimmett *et al.*, (2008). The distribution of Marbled Teal is not mentioned at Rangla Wetlands Complex in Punjab and Saji Dam area in Balochistan (Roberts, 1991; 1992; Grimmett *et al.*, 1998; Kazmierczak, 2000; Grimmett *et al.*, 2008); however it has been recorded at these places during the present study. Similarly, the occurrence of Ferruginous duck or White-eyed Pochard is not mentioned in Gawadar area (Roberts 1991; 1992; Grimmett *et al.*, 1998; Kazmierczak, 2000; Grimmett *et al.*, 2008), however, was recorded during the present study.

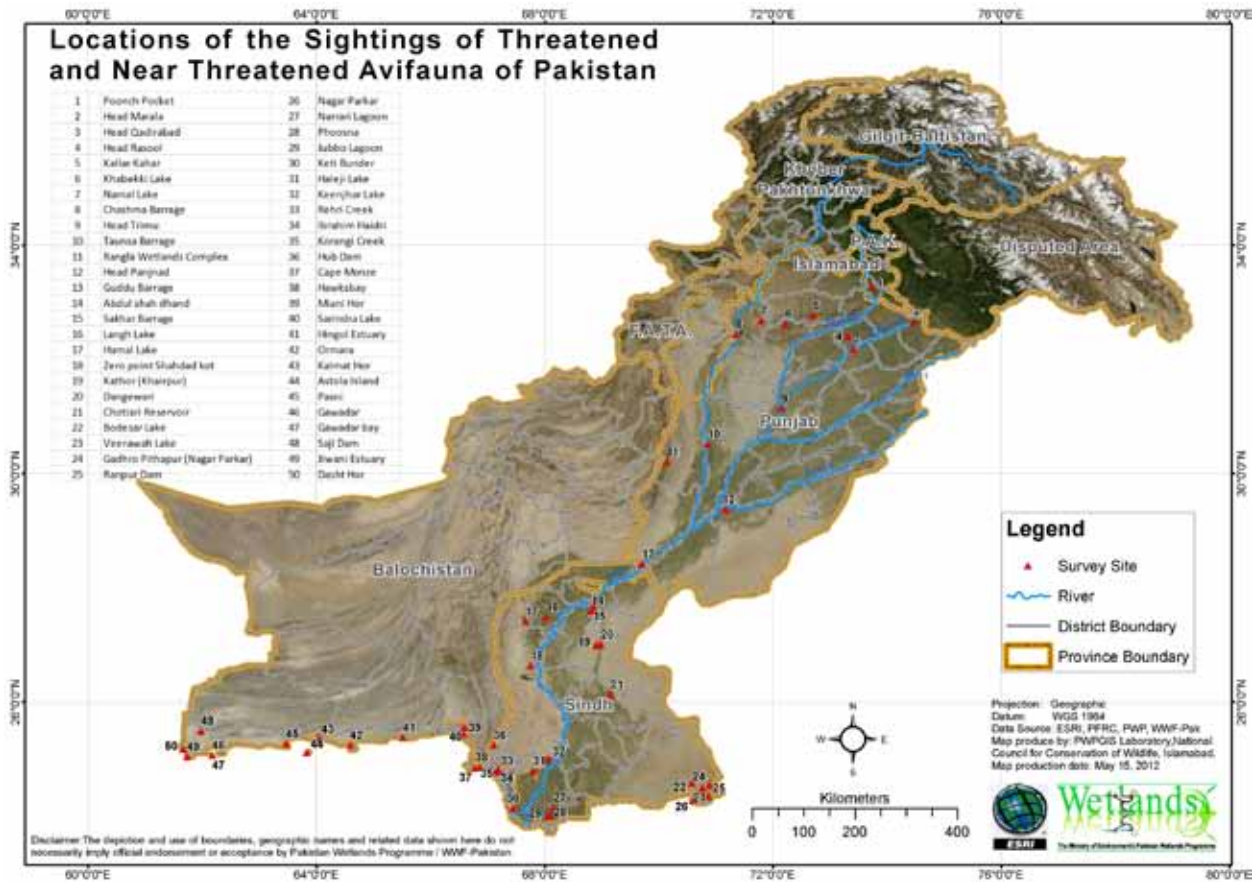


Figure 1: Locations of the sightings of Threatened and Near Threatened avifauna of Pakistan

Classification of bird species on the basis of IUCN Redlist criteria

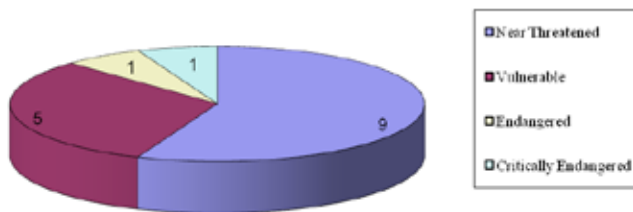


Figure 2. Classification of sixteen bird species on the basis of IUCN Red list criteria 2011.2

Classification of birds on the basis of feeding habits of the birds

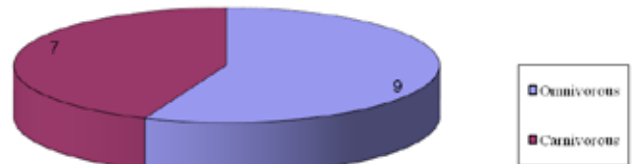


Figure 4: Classification of sixteen birds on the basis of feeding habits of the birds

Classification of birds on the basis of their occurrence and visit to the study area

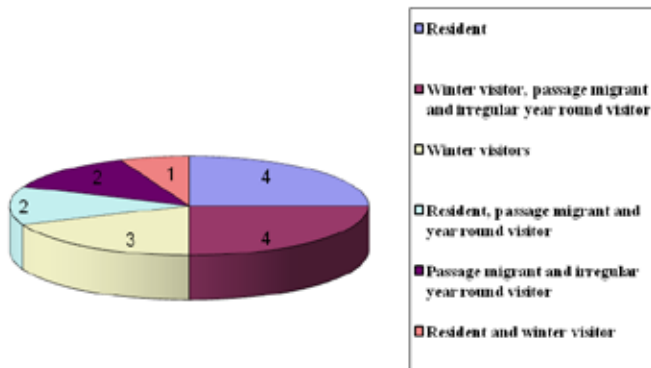


Figure 3. Classification of sixteen birds on the basis of occurrence and visit to the study area

Brief account of the species and their sightings

1. Marbled Teal *Marmaronetta angustirostris*

This species is resident in Balochistan, Punjab and Sindh provinces of Pakistan (Roberts, 1991; Grimmett *et al.*, 1998; Kazmierczak, 2000; Grimmett *et al.*, 2008). Its population has declined as a result of extensive habitat destruction. It, therefore, qualifies as Vulnerable (BirdLife, 2012). Grimmett *et al.*, (2008) are of the view that there are no breeding or wintering records of this species in Punjab Province. However, 19 adult individuals were observed during surveys from April 13-16, 2010 at Rangla Wetlands Complex (RWC) in district Muzaffargarh of Punjab province. Similarly, a flock of 32 individuals including six nestlings of about one week old and two empty nests were observed at RWC during surveys from June 2-4, 2010. Further, two adult individuals were seen on January 18th, 2011 and four adult individuals were seen on January 15th, 2012 at the same site. A total of two individuals were seen at Dangewari Lake in district Khairpur on January 21st, 2012. A total

of 31 adult individuals were seen on January 22nd, 2010 and 12 adults were seen on January 24th, 2012 at Saji Dam in Balochistan. This sighting is important as the distribution of Marbled Teal is not mentioned in Gawadar and Jiwani areas in Roberts (1991) and Grimmett *et al.*, (2008). A total of 11 birds were seen at Zero point, Sahahdad Kot, on January 15th, 2010.

2. Ferruginous Duck or White-eyed Pochard *Aythya nyroca*

This species breeds at Zangi Nawar Lake, Balochistan when water conditions are favourable, however, is also a winter visitor, passage migrant and irregular year round visitor in Pakistan (Roberts 1991; Grimmett *et al.*, 2008). It qualifies as Near Threatened and its population has declined by the degradation and destruction of well-vegetated shallow pools and other wetland habitats (BirdLife, 2012). During midwinter waterfowl counts in January 2010, a total of 444 adult individuals were observed at 9 sites i. e. Haleji Lake (10), Hawkesbay (30), Hab Dam (32), Keenjhar Lake (20), Narrari Lagoon (70), Phoosna (8), Poonch Pocket (161), Head Qadirabad (100) and Ranpur Dam (13). Similarly, during midwinter waterfowl counts in January 2011, a total of 67 adult individuals were seen at three sites i.e. Chashma Barrage (24), Khabeki Lake (34) and Taunsa Barrage (9). However, during midwinter waterfowl counts in January 2012, a total of 177 adult individuals were observed at nine different sites i.e. Abdul Shah Dhand (38), Dangewari (04), Gadhro Pithapur (17), Hamal Lake (42), Head Rasool (54), Kathor (08), Langh Lake (4), Ranpur Dam (4), and Saji Dam (6).

3. Pallas's fish Eagle *Haliaeetus leucoryphus*

This species is resident in Pakistan (Roberts, 1991; Grimmett *et al.*, 2008) and its population has declined due to habitat loss, degradation and disturbance of wetlands and breeding sites throughout its range. It, therefore, qualifies as Vulnerable (BirdLife, 2012). During midwinter waterfowl counts in January 2010, an adult pair was seen at Taunsa Barrage on January 11th, 2010. Further, during breeding midwinter waterfowl counts in January 2011, a single adult male was seen at Taunsa Barrage on January 17th, 2011. Similarly, during midwinter waterfowl counts in January 2012, one adult male was observed at Taunsa Barrage on January 13th, 2012 and one adult male was observed at Chotiari Reservoir on January 26th, 2012.

4. Sociable Lapwing *Vanellus gregarius*

This species is winter visitor from September-October to March-April in its non-breeding plumage in Pakistan (Roberts, 1991; Grimmett *et al.*, 2008) and is considered to have undergone significant and rapid decline in the second half of the 20th century and is designated as Globally Threatened (Critically Endangered) bird species (BirdLife, 2012). On October 18th, 2011, two adult individuals were seen at Dera Malik Bashir Pannuan Mouza Bakhri near Head Panjnad. Similarly, next day on October 19th, 2011, a total of 05 adult individuals were seen at the same place. This area is a part of Satluj River and included in the Panjnad Wildlife Sanctuary.

5. Sarus Crane *Grus antigone*

This species is resident breeding in Pakistan (Roberts, 1991). One pair was found breeding in 2004 in Nagar Parkar of district Thar Parkar. Its population has declined, due to the loss and degradation of wetlands as a result of drainage and conversion to agriculture land, ingestion of pesticides, the hunting of adults and collection of eggs and chicks for trade, food and medicinal purposes. It qualifies as Vulnerable (BirdLife, 2012). On December 21st, 2012, an adult pair was seen at Abasar Talab near Nagar Parkar town. The pair continued to stay at this pond till March 18th, 2012 and then moved to Saanga Talab near Veera Wah. The pair was seen last time at this place on March 31st, 2012. Similarly, one pair was seen at Bando Goth Talab near Nagar Parkar in September 2011. A pair was breeding in 2004 at Bhansar Talab near Nagar Parkar.

6. Dalmatian Pelican *Pelecanus crispus*

This species is winter visitor, passage migrant and irregular year round visitor in Pakistan (Roberts, 1991; Grimmett *et al.*, 2008). Its population has decreased due to habitat loss, disturbance, water pollution, collision with overhead power-lines and hunting. It qualifies as Vulnerable (BirdLife, 2012). During midwinter waterfowl counts in January 2010, a total of 1,199 individuals were seen at 12 different sites i.e. Gawadar (98), Miani Hor (176), Narrari Lagoon (175), Pasni (132), Phoosna (12), Saji Dam (43), Astola Island (7) Hawkesbay (6), Hingol Estuary (342), Jiwani Estuary (98), Jubbho Lagoon (15) and Kalmat Hor (87). During midwinter waterfowl counts in January 2011, a total of 12,656 individuals were seen at five different sites i.e. Narrari Lagoon (1,523), Ormara (5), Sakar Tali near Nagar Parkar (10,112), Jiwani Estuary (107) and Jubbho Lagoon (909). During midwinter waterfowl counts in January 2012, a total of 2,060 individuals were seen at 6 different sites i.e. Narrari Lagoon (92), Saji Dam (490), Sankar near Nagar Parkar (1,266), Gawadar (22), Hingol Estuary (18) and Jiwani Estuary (172).

7. Black-bellied Tern *Sterna acuticauda*

This species is resident and winter visitor in Pakistan. The species is almost extinct in a large part of its range, but remains locally common throughout the Indian subcontinent (Roberts, 1991; Grimmett *et al.*, 2008). Its population has declined qualifying the species as globally Near Threatened (BirdLife, 2012). During midwinter waterfowl counts in January 2010, a total of 150 individuals were seen at seven different sites i.e. Taunsa Barrage (14), Narrari Lagoon (70), Rehri Creek (30), Sukhur Barrage (12), Haleji Lake (4), Hub Dam (8) and Keenjhar Lake (12). During midwinter waterfowl counts in January 2011, a total of 311 individuals were seen at 5 different sites i.e. Taunsa Barrage (48), Head Trimmu (16), Ketu Bunder (22), Head Marala (5) and Sakar Tali near Nagar Parkar (220). Further, during midwinter waterfowl counts in January 2012, a total of 136 individuals were seen at seven different sites i.e. Hub Dam (22), Ormara (6), Head Panjnad (06), Sarindra Lake (27), Sukhur Barrage (35), Guddu Barrage (21) and Taunsa Barrage (19).

8. Black-headed Ibis *Threskiornis melanocephalus*

This species is resident, passage migrant and irregular year round visitor in Pakistan (Roberts, 1991; Grimmett *et al.*, 2008). It faces the full gambit of threats, from hunting and disturbance at breeding colonies to drainage and conversion of foraging habitats to agriculture. It is undergoing a population reduction and qualifies as globally Near Threatened (BirdLife, 2012). During midwinter waterfowl counts in January 2012, only two individuals were observed at Veerawah Lake in district Tharparkar on January 18th, 2012.

9. Black-necked Stork *Ephippiorhynchus asiaticus*

This species is very rare, irregular year round visitor to major lakes in both Sindh and Punjab provinces of Pakistan (Roberts, 1991; Grimmett *et al.*, 2008). Formerly, it bred in mangroves in Indus Delta but not recorded since late 1970's (Grimmett *et al.*, 2008). Its population has declined and therefore qualifies as globally Near Threatened (BirdLife, 2012). During midwinter waterfowl counts in January 2010, only two individuals were seen at Head Marala on January 12th 2010.

10. Black-tailed Godwit *Limosa limosa*

This species is winter visitor in Pakistan (Roberts, 1991; Grimmett *et al.*, 2008). Its population has declined rapidly in parts of its range owing to changes in agricultural practices, therefore, qualifies as Near Threatened (BirdLife, 2012). During midwinter waterfowl counts in January 2010, a total of 1,812 individuals were seen at 10 different sites i.e. Cape Monze (33), Hawkesbay (380), Hingol Estuary (14), Jubbho Lagoon (180), Keenjhar Lake (32),

Miani Hor (241), Narrari Lagoon (490), Phoosna (25), Ranpur Dam (04) and Rehri Creek (413). During midwinter waterfowl counts in January 2011, a total of 202 individuals were seen at three different sites i.e. Chashma Barrage (45), Jiwani Estuary (147) and Kallar Kahar Lake (10). Further, during midwinter waterfowl counts in January 2012, a total of 72 individuals were seen at four different sites i.e. Miani Hor (49), Narrari Lagoon (6), Pasni (11) and Veerawah Lake (6).

11. Eurasian Curlew *Numenius arquata*

This species is winter visitor, passage migrant and irregular year round visitor in Pakistan (Roberts 1991; Grimmitt *et al.*, 2008). Its decline has been recorded in several key populations and overall a moderately rapid global decline has been reported, therefore, it qualifies as Near Threatened (BirdLife, 2012). During midwinter waterfowl counts in January 2010, a total of 1,154 individuals were seen at 18 different sites i.e. Astola Island (35), Bodesar Lake (2), Cape Monze (36), Gawadar (138), Hawkesbay (40), Head Trimmu (5), Hingol Estuary (28), Jiwani Estuary (102), Jubbho Lagoon (23), Kalamat Khor (36), Keenjhar Lake (5), Ketu Bunder (90), Miani Hor (328), Narrari Lagoon (26), Pasni (116), Rehri Creek (97), Saji Dam (43) and Sarinda Lake (04). Similarly, during midwinter waterfowl counts in January 2011, a total of 1,310 individuals were seen at seven different sites i.e. Gawadar (136), Hingol Estuary (172), Jiwani Estuary (492), Kalamat Hor (190), Ketu Bunder (30), Miani Hor (281) and Ormara (9). Further, during midwinter waterfowl counts in January 2012, a total of 7,091 individuals were seen at 21 different sites i.e. Chashma Barrage (17), Dasht Hor (43), Gawadar Bay (22), Gawadar (15), Hawkesbay (2050), Hingol Estuary (57), Hub Dam (27), Ibrahim Haidri (125), Jiwani Estuary (62), Kallar Kahar (01), Ketu Bunder (450), Korangi Creek (3,670), Miani Hor (177), Namal Lake (3), Ormara (81), Pasni (177), Head Panjnad (2), Saji Dam (12), Sarinda Lake (21), Veerawah Lake (4) and Zero point Shahdad Kot area (75).

12. Great Knot *Calidris tenuirostris*

This species is rare winter visitor in Pakistan (Roberts, 1991; Grimmitt *et al.*, 2008). It is qualified as Vulnerable owing to rapid population decline caused by reclamation of non-breeding stopover grounds (BirdLife, 2012). During midwinter waterfowl counts in January 2010, 15 individuals were seen at Miani Hor. During midwinter waterfowl counts in January 2012, six individuals were seen at Chotiari Reservoir and two individuals were seen at Phoosna.

13. Lesser Flamingo *Phoenicopterus minor*

This species is resident in district Badin in Pakistan (Roberts, 1991; Grimmitt *et al.*, 2008). It qualifies as Near Threatened because populations appear to be undergoing a moderately rapid reduction (BirdLife, 2012). During midwinter waterfowl counts in January 2010, 150 individuals were seen at Narrari Lagoon. During midwinter waterfowl counts in January 2011, 518 individuals were seen at Narrari Lagoon and 350 individuals in Nagar Parkar area. Further, during midwinter waterfowl counts in January 2012, 112 individuals were seen at Narrari Lagoon and 52 individuals in Nagar Parkar area.

14. Oriental Darter *Anhinga melanogaster*

This species is resident in Pakistan (Roberts, 1991; Grimmitt *et al.*, 2008). It is qualified as Near Threatened because its population has declined due to pollution, drainage, hunting and collection of eggs and nestlings (BirdLife, 2012). During midwinter waterfowl counts in January 2010, a total of 16 individuals were seen at four different sites i.e. Hub Dam (4), Keenjhar Lake (2), Narrari Lagoon (8) and Phoosna (2). However, during midwinter waterfowl counts in 2011 and 2012, no individuals were seen.

15. Painted Stork *Mycteria leucocephala*

This species is resident and winter visitor in Pakistan (Roberts, 1991; Grimmitt *et al.*, 2008). Its population has declined due to hunting, drainage and pollution and therefore qualifies as Near Threatened (BirdLife, 2012). During midwinter waterfowl counts in January 2010, two individuals were seen at Head Marala. During midwinter waterfowl counts in January 2011, six individuals were seen at Ketu Bunder. Further, during midwinter waterfowl counts in January 2012, eight individuals were seen at Pasni.

16. White-headed Duck *Oxyura leucocephala*

This species is winter visitor in Pakistan (Roberts, 1991; Grimmitt *et al.*, 2008). Its population has rapidly declined and therefore qualifies as globally Endangered (BirdLife, 2012). A total of 14 individuals were seen at Khabeki Lake in Salt Range area in December 2006.

Conclusion and Recommendations

Threatened species lists fulfill important political, social and scientific needs. For example, lists of endangered species are very useful in explaining to people the importance of recovery or loss of species. In most circumstances, they are the only tools available that have a clear social mandate and that rest on substantial sound ecological knowledge. This study provides an ornithological baseline data of Threatened and Near Threatened species for significant wetlands in Pakistan where future population trends can be compared. Therefore, we recommend that the sites where Threatened and Near Threatened bird species were recorded should be monitored regularly in future especially during midwinter waterfowl counts. Further, these areas should be declared as Protected Areas and rules and legislations should be reviewed for putting these species under protected category. There is need to increase the watch and ward mechanism and to launch awareness campaigns especially during migratory seasons to control illegal hunting.

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Annex: 1. Final checklist of Threatened and Near Threatened bird species observed during the study from December 2006 to January 2012 in Pakistan

#	Scientific Name	Common Name	Feeding habit	Major food items	Occurrence in Country	Global population size	IUCN 2011.2 Red list criteria
FAMILY-ANHINGIDAE							
1	<i>Anhinga melanogaster</i>	Oriental Darter	Carnivorous	Fish, water snakes, insects	Resident, Passage migrant and irregular year round visitor	11,000 mature individuals	Near Threatened
FAMILY-PELECANIDAE							
2	<i>Pelecanus crispus</i>	Dalmatian pelican	Carnivorous	Birds, fish, amphibians, small snakes, insects and invertebrates	Winter visitor, passage migrant and irregular year round visitor	10,000-13,900 mature individuals	Vulnerable
FAMILY-CICONIIDAE							
3	<i>Mycteria leucocephala</i>	Painted Stork	Carnivorous	Fish, amphibians, reptiles,	Resident and winter visitor	25,000 mature individuals	Near Threatened
4	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	Carnivorous	Birds, fish, amphibians, reptiles and invertebrates	passage migrant and irregular year round visitor	10,000-21,000 mature individuals	Near Threatened
FAMILY-THRESKIORNITHIDAE							
5	<i>Threskiornis melanocephalus</i>	Black-headed Ibis	Carnivorous	Fish, amphibians, insects and invertebrates	Resident, passage migrant and irregular year round visitor	20,000 mature individuals	Near Threatened
FAMILY-PHOENICOPTERIDAE							
6	<i>Phoenicopterus minor</i>	Lesser Flamingo	Omnivorous	Algae, shrimp, plant seeds, larvae of crustaceans, small insects	Resident	2,200,000-3,240,000 mature individuals	Near Threatened
FAMILY-ANATIDAE							
7	<i>Marmaronetta angustirostris</i>	Marbled Teal	Omnivorous	Insects, invertebrates, seeds,	Resident	14,000-26,000 mature individuals	Vulnerable
8	<i>Aythya nyroca</i>	Ferruginous Pochard	Omnivorous	Seeds, roots, aquatic plants, invertebrates, insects, small fish and amphibians	Winter visitor, passage migrant and irregular year round visitor	160,000-257,000 mature individuals	Near Threatened
9	<i>Oxyura leucocephala</i>	White-headed Duck	Omnivorous	Insects, aquatic invertebrates, seeds, aquatic plants	Winter visitor	7,900-13,100 mature individuals	Endangered
FAMILY-ACCIPITRIDAE							
10	<i>Haliaeetus leucoryphus</i>	Pallas's fish Eagle	Carnivorous	Fish	Resident	2,500-9,999 mature individuals	vulnerable

#	Scientific Name	Common Name	Feeding habit	Major food items	Occurrence in Country	Global population size	IUCN 2011.2 Red list criteria
FAMILY-GRUIDAE							
11	<i>Grus antigone</i>	Sarus Crane	Omnivorous	Insects, aquatic plants, fish, amphibians, birds, invertebrates, seeds	Passage migrant and irregular year round visitor	19,000-21,800 mature individuals	vulnerable
FAMILY-CHARADRIIDAE							
12	<i>Vanellus gregarius</i>	Sociable lapwing	Omnivorous	Insects, plant matter, grains, leaves, flowers, invertebrates	Winter visitor, passage migrant and irregular year round visitor	11,000 mature individuals	Critically Endangered
SUB-FAMILY CALIDRIDINAE							
13	<i>Calidris tenuirostris</i>	Great Knot	Omnivorous	Plant material, berries, insects, spiders, invertebrates	Winter visitor	290,000 mature individuals	Vulnerable
SUB-FAMILY TRINGINAE							
14	<i>Limosa limosa</i>	Black-tailed Godwit	Carnivorous	Insects, invertebrates, fish eggs, tadpoles of frog, plant material, berries and seeds	Winter visitor	630,000-805,000 mature individuals	Near Threatened
15	<i>Numenius arquata</i>	Eurasian Curlew	Omnivorous	Insects, invertebrates, berries, seeds, small fish, amphibians, lizards, birds and small rodents	Winter visitor, passage migrant and irregular year round visitor	770,000-1,065,000 mature individuals	Near Threatened
FAMILY-STERNIDAE							
16	<i>Sterna acuticauda</i>	Black-bellied Tern	Omnivorous	Insects, invertebrates, fish eggs, tadpoles of frog, berries, seeds, grains	Resident	630,000-805,000 mature individuals	Near Threatened