

## Studies on the Population Status of Water Birds in Major Wetlands of Upper Punjab

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### Abstract

The study presents the counts of wintering population of birds at eight major water bodies of upper Punjab; the Chashma and Jinnah barrages, Shah Pur Dam and Kallar Kahar, Ucchali, Nammal, Khabbaki and Jhalhar lakes. The field work conducted during the months of January and November 2007, and January 2008. Population counts represented that a large population of birds visited these water bodies in winter. The most common birds encountered were anatids while the common pochard (*Aythya ferina*) was found to be dominating at all the water bodies.

**Keywords:** waterfowl census, water bodies, census, Chashma and Jinnah barrages, Shah Pur Dam, Ucchali complex, Kallar Kahar, Nammal, common pochard, anatids.

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### Introduction:

Migratory birds are one of the important indicators for the ecological conditions and the productivity of the wetland ecosystem. For the better management and conservation, it is desirable to study and monitor migratory patterns, population dynamics and distribution status of migratory birds regularly. Pakistan is signatory of Convention on Migratory Species of fauna (1983), which is an intergovernmental treaty that aims to conserve the terrestrial, marine and avian species, especially water birds over whole range of their migratory route (Wetlands International, 2007). This convention requires the member states to take measures for the conservation of migratory water birds and to conduct census of birds regularly (Scott and Poole, 1989).

Midwinter Waterfowl Census initially progressed globally in 1970, however, the results of these censuses have been documenting regularly since 1987. These censuses are now carried out in collaboration with Wetlands International and it includes 535 wetland sites globally (Wetlands International, 2007).

Numerous studies have examined the population estimates of water birds at different wetlands of upper Punjab. Azam (1994) reported 86 water bird species from 5 different wetlands of the Salt Range, Punjab. Javed (2002) reported 34 species of water birds from Chashma Barrage. Chaudhry and Khan (1988) recorded 17 species of waterfowls from 13 different wetlands of Punjab. Ali and Akhtar (2005) reported 149 species, including 61 water bird species from 16 different wetlands of upper

Punjab. Present paper is based on population census of waterfowls at some of the important wetlands of upper Punjab i.e. Chashma Barrage, Shah Pur Dam, Ucchali Complex (Ucchali lake, Jhalhar lake and Khabbaki lake), Nammal lake and Kallar Kahar lake (Fig. 1). The present counts were produced as part of Midwinter Waterfowl Census conducted in November and January 2007 and in January 2008.

### Study Area:

During the present study the water bird census was carried out at 8 lakes located in the upper Punjab, Pakistan. Few of these lakes are so large which can support a rich fauna and flora. Water of some lakes is slightly saline because of their situation in the salt range. Details of the study sites are given individually as follows.

### Chashma Barrage:

Chashma barrage (32° 31'N, 71° 29' E) is located about 25 km southwest of Mianwali on Mianwali Dera Ismail Khan road. This wetland comprises of a large barrage on the river Indus with a series of embankments (flood-bunds) which divide the wetland into five lakes, each spreading over an area of about 250 sq km. Depth of these lakes vary from 0.2 m during the dry season and 8 m in the monsoon floods while the depth of the main river varies from 4.6 m to 8.8 m.

The aquatic vegetation consists of *Hydrilla verticillata*, *Nelumbium speciosum*, *Nymphaea lotus*, *Typha angustata*, *Pragmites karka*, *Potamogeton pectinus*, *Saccharum spontaneum*, *Vallisneria spiralis* and *Zannichellia palustris*.

Terrestrial vegetation around this lake system is a mixture of subtropical semi-evergreen scrub and tropical thorn forest which is dominated by *Olea ferruginea*, *Acacia modesta*, *A. nilotica*, *Adhatoda vasica*, *Dodonaea viscosa*, *Tamarix aphylla*, *T. dioica*, *Zizyphus mauritiana*, *Z. nummularia*, *Chrysopogon aucheri*, *Lasiurus hirsutus*, *Heteropogon contortus* and *Panicum antidotale*. Considering the importance of this wetland it was declared as wildlife sanctuary and categorized as a Ramsar Site.

#### **Nammal Lake:**

Nammal lake is situated (32° 41'N, 71° 48' E) about 29 km northeast of Mianwali. It is spread over an area of about 486 ha. It is a shallow water lake consisting of a small dam at one of its corners. Several small streams and a spring which flow from the hills of the Salt Range also feed it. Depth of the lake varies between 2 to 6 m with the average of 4.6 m. Water level fluctuates substantially due to its withdrawn for irrigation purpose. Water of this lake is slightly saline.

The aquatic vegetation consists of *Carex fedia*, *Hydrilla verticillata* *Juncus spp.*, *Phragmites karka*, *Potamogeton crispus*, *Saccharum spontaneum*, *Typha angustifolia* and *Zannichellia palustris*. The terrestrial vegetation of the region is a mixture of subtropical semi-evergreen scrub and tropical thorn scrub dominated by *Acacia modesta*, *A. nilotica*, *Adhatoda vasica*, *Dodonaea viscosa*, *Gymnosporia royleana*, *Olea ferruginea*, *Prosopis cineraria*, *Reptonia buxifolia*, *Salvadora oleoides*, *Tamarix aphylla*, *T. dioica*, *Zizyphus mauritiana*, *Z. nummularia*, *Chrysopogon aucheri*, *Lasiurus hirsutus*, *Heteropogon contortus* and *Panicum antidotale*. *Prosopis glandulosa* is introduced in the area. Most of the land adjacent to the lake has privately been utilized for agriculture. The wetland is declared as wildlife sanctuary.

#### **Ucchali Lake:**

It is situated (32° 33'N, 72° 25' E) about 13 km west of Nowshehra town and 42 km northwest of Khushab. It is a saline lake with a little marshy vegetation and almost entirely surrounded by agricultural land. The lake is fed by a small spring which comes out of the adjacent agriculture lands. It used to be one of the largest lakes of the Punjab but due to previous long drought spell its area dwindled and turned into a small marsh. During the

recent past the lake received adequate quantity of water and most of its area got inundated which revived more or less its previous status. Marshy vegetation is confined to a few small patches along the shore. The dominant aquatic plants are *Carex fedia*, *Hydrilla verticillata*, *Juncus spp.*, *Phragmites karka*, *Potamogeton crispus*, *Saccharum spontaneum*, *Typha angustifolia*, *Vallisneria spiralis* and *Zannichellia palustris*. The terrestrial vegetation around the lake is a mixture of subtropical semi-evergreen forest and tropical thorn forest dominated with *Acacia modesta*, *Adhatoda vasica*, *Dodonaea viscosa*, *Gymnosporia royleana*, *Olea ferruginea*, *Reptonia buxifolia*, *Tamarix aphylla*, *Withania coagulans* and *Zizyphus spp.* The natural vegetation of the lake in its surroundings has been cleared off to use the land for agricultural means. The lake is covered with very rich growth of phytoplankton.

#### **Khabbaki Lake:**

Khabbaki lake is situated (32° 37'N, 72° 13' E) about 10 km north of Nowshehra town and 38 km northwest of district Khushab. The lake covers an area of about 283 ha. Water level of the lake recorded maximum in 1985 and 1987 but the lake remained completely dried during the past many years. Due to long dehydration and dryness the lake was completely lacking of aquatic vegetation. Terrestrial vegetation around the lake was similar to the flora of Ucchali lake. Last year (2008), it received only a small quantity of water which just rejuvenated its posture.

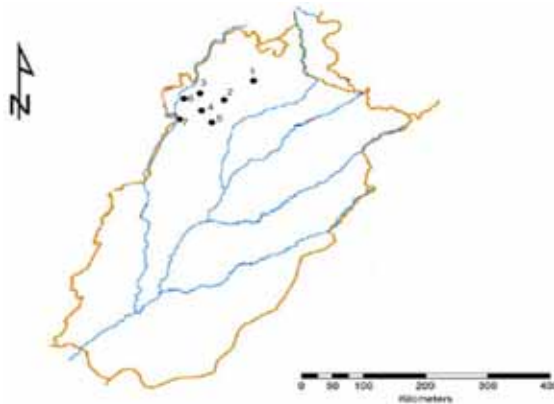
#### **Jhalar Lake:**

Jhalar lake is located (32° 30'N, 72° 54' E) about 10 km southeast of Ucchali lake and 10 km southwest of Nowshehra, district Khushab. This small brackish lake has an area of 100 ha. General features and vegetation of this lake is similar to Ucchali and Khabbaki lakes. Water resource of the lake depends upon small channels which originate from the surrounding hills.

#### **Kallar Kahar Lake:**

The lake is sited (32° 46'N, 72° 42' E) some 25 km southwest of Chakwal in the vicinity of Kallar Kahar town. This small brackish lake covers an area of 220 ha. It has dense marginal vegetation along the lake dominated by *Typha angustifolia*, *Saccharum spp.* and *Phragmites karka* and also it has sparse submerged vegetation. There are a few orchards along the

southern bank of the lake. Terrestrial vegetation around the lake is similar to the typical flora of the Salt Range.



1. Kallar Kahar lake, 2. Khabbaki lake, 3. Namal lake, 4. Uchali lake, 5. Jhalar lake, 6. Jinnah barrage, 7. Chashma barrage.

Fig. 1 Map showing wetland areas of upper Punjab.

**Shah Pur Dam:**

Shah Pur Dam is a water reservoir situated (33° 35'N, 72°41'E) near Fath-e-Jhang city in district Attock. The dam was constructed for the purpose of irrigation. It is well known inhibiting a good population of water birds and provides the wintering grounds to the seasonal migratory birds during their passage. The wetland has light submerged vegetation and dense marginal vegetation which is dominantly represented by *Typha angustifolia*, *Saccharum spp.* and *Phragmites Karka*. The wetland is facing a serious threat of degradation due to unwarranted fishing and other anthropogenic activities like poaching and hunting.

**Jinnah Barrage:**

Jinnah barrage is situated (32° 55'N, 71° 31'E) about 50Km Northwest of Mianwali city. It has a voluminous watershed in the main downstream (river Indus). Few small ponds are also located at the adjacent peripheries. The wetland has light submerged vegetation. The barrage is unique in having good concentration of anatids both at upstream and downstream of the barrage and also supports a variety of water birds.

**Material and Methods:**

The wetlands were surveyed in January and November 2007, and January 2008. Each wetland was visited three times during the study period and counts were made at five different selected points. The birds were directly observed, identified and counted with the help of binoculars (Olympus 8-16 X 40, DPS I) and spotting scopes (Nikon w/ 15-45 X). The GPS receiver (Magellan SporTrack) was also used to record the coordinate of the wetland. For identification of water birds, Sonobe and Usui (1993) were referred. The total population of the birds was determined by direct counts.

**Results and Discussion:**

During the present study 45 species of water birds belonging to 13 families and 7 orders were recorded at the wetlands of upper Punjab (Table-I-IV). Common coot (*Fulica atra*) was found to be the most dominant species in all the wetlands followed by common pochard (*Aythya ferina*) and shovler (*Anas clypeata*), respectively. Chashma barrage was observed to have a larger population of water birds as compared to other studied wetlands of upper Punjab (Fig. 2).

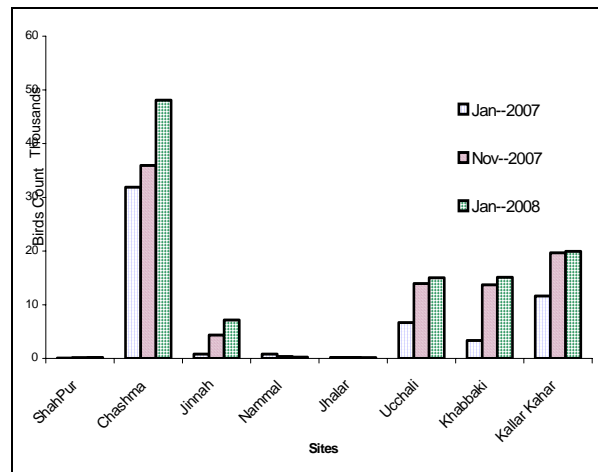


Fig 2: Temporal changes in the population of water birds at different wetlands.

The variation in the abundance of the water birds may be attributed to a number of factors. However, sparse distribution of birds in Khabbaki and Uchali Lake may be due to little or no water in these lakes. The population of birds in these lakes increased substantially during January 2007 when water level got raised.

Table I: Number of water birds observed at Shah Pur Dam, Chashma barrage, Jinnah barrage and Nammal Lake.

Common and Scientific Names	Shah Pur Dam			Chashma Barrage			Jinnah barrage			Nammal lake		
	Jan 2007	Nov 2007	Jan 2008	Jan 2007	Nov 2007	Jan 2008	Jan 2007	Nov 2007	Jan 2008	Jan 2007	Nov 2007	Jan 2008
Little Grebe ( <i>Tachybaptus ruficollis</i> )	5	50	53	575	465	230	25	8	5	45	4	5
Great Crested Grebe ( <i>Podiceps cristatus</i> )	0	0	0	0	0	0	0	0	12	0	6	8
Black-necked Grebe ( <i>Podiceps nigricollis</i> )	0	0	0	0	15	25	0	0	0	0	0	0
Large Cormorant ( <i>Phalacrocorax carbo</i> )	0	0	0	138	150	562	30	300	325	0	0	0
Indian Cormorant ( <i>Phalacrocorax fuscicollis</i> )	0	0	0	5	0	0	0	0	0	0	0	0
Little Cormorant ( <i>Phalacrocorax niger</i> )	0	12	15	30	800	412	50	335	134	62	70	0
Darter or Snake Bird ( <i>Anhinga melanogaster</i> )	0	0	0	4	0	0	0	0	0	0	0	0
Night Heron ( <i>Nycticorax nycticorax</i> )	0	0	0	5	0	0	0	0	0	0	0	0
Indian Pond Heron ( <i>Ardeola grayii</i> )	2	2	0	130	120	25	0	180	10	0	6	0
Cattle Egret ( <i>Bubulcus ibis</i> )	0	0	0	22	0	17	0	0	0	0	0	0
Little Egret ( <i>Egretta garzetta</i> )	5	0	10	73	315	335	45	264	35	63	215	12
Intermediate Egret ( <i>Egretta intermedia</i> )	0	0	0	48	62	712	20	18	0	45	0	0
Large Egret ( <i>Egretta alba</i> )	2	0	8	67	88	316	32	24	5	52	0	12
Gray Heron ( <i>Ardea cineria</i> )	0	0	0	35	58	104	0	5	16	4	0	0
Purple Heron ( <i>Ardea purpurea</i> )	0	0	0	5	0	0	0	0	0	3	0	0
Greater Flamingo ( <i>Phoenicopterus ruber</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Ruddy Shelduck ( <i>Tadorna ferruginea</i> )	0	0	0	0	0	0	0	0	532	0	0	0
Common Shelduck ( <i>Tadorna tadorna</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Eurasian Wigeon ( <i>Anas penelope</i> )	0	0	0	1,250	20	800	30	800	512	45	0	0
Gadwall ( <i>Anas strepera</i> )	0	0	0	1680	1150	1200	45	1,600	200	0	0	25
Common Teal ( <i>Anas crecca</i> )	0	0	0	580	700	850	120	15	1,225	0	0	0
Mallard ( <i>Anas platyrhynchos</i> )	0	0	0	1,240	1,450	604	48	30	2,050	350	0	0

Northern Pintail ( <i>Anas acuta</i> )	0	0	0	830	690	342	10	35	52	60	0	20
Shovler ( <i>Anas clypeata</i> )	0	0	0	1,150	1,200	1,800	25	18	1,150	0	0	80
Red-crested Pochard ( <i>Netta rufina</i> )	0	0	0	0	2	0	0	0	0	0	0	0
Common Pochard ( <i>Aythya ferina</i> )	0	0	0	4,300	7,500	15,000	25	20	315	0	0	0
Tufted Duck ( <i>Aythya fuligula</i> )	0	0	0	350	415	650	0	0	105	0	0	0
Indian Moorhen ( <i>Gallinula chloropus</i> )	15	25	33	139	127	215	6	5	8	15	13	17
Purple Moorhen ( <i>Porphyrio porphyrio</i> )	0	0	0	26	30	98	0	0	0	0	0	0
Common Coot ( <i>Fulica atra linnaeus</i> )	12	50	68	18,200	19,000	21,000	225	200	316	15	15	30
Pheasant-tailed Jacana ( <i>Hydrophasianus chirurgus</i> )	0	0	0	0	0	4	0	0	0	0	0	0
Black-winged Stilt ( <i>Himantopus himantopus</i> )	5	6	4	380	432	680	0	114	25	12	16	20
Kentish Plover ( <i>Charadrius alexandrinus</i> )	0	0	0	0	2	8	15	6	0	0	15	0
Red-Wattled Lapwing ( <i>Holopterus indicus</i> )	4	3	5	35	25	34	8	30	21	0	2	0
Northern Lapwing ( <i>Vanellus vanellus</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Little Stint ( <i>Calidris minuta</i> )	0	0	0	17	4	12	17	7	0	0	0	0
Common Snipe ( <i>Gallinago gallinago</i> )	0	0	0	0	2	0	0	0	2	0	0	0
Spotted Redshank ( <i>Tringa erythropus</i> )	0	0	0	7	0	0	7	0	0	4	0	0
Common Redshank ( <i>Tringa totanus</i> )	0	0	0	22	0	0	17	25	6	9	0	0
Green shank ( <i>Tringa nebularia</i> )	4	0	2	7	25	42	0	4	4	3	0	0
Green Sandpiper ( <i>Tringa ochropus</i> )	0	0	0	12	17	0	19	5	0	10	0	0
Wood Sandpiper ( <i>Tringa glareola</i> )	0	0	0	5	2	0	0	0	0	3	0	0
Common Sandpiper ( <i>Actitis hypoleucos</i> )	0	0	0	3	0	4	0	0	0	0	0	0
Black-headed Gull ( <i>Larus ridibundus</i> )	0	0	0	280	315	754	0	20	31	15	0	0
Gray River Tern ( <i>Sterna aurantia</i> )	5	7	11	230	750	1246	0	275	56	0	0	0
<b>Total number of birds</b>	<b>59</b>	<b>155</b>	<b>209</b>	<b>31,880</b>	<b>35,931</b>	<b>48,081</b>	<b>819</b>	<b>4,343</b>	<b>7,152</b>	<b>815</b>	<b>362</b>	<b>229</b>
<b>Total number of species</b>	<b>10</b>	<b>8</b>	<b>10</b>	<b>35</b>	<b>31</b>	<b>31</b>	<b>24</b>	<b>26</b>	<b>26</b>	<b>19</b>	<b>10</b>	<b>10</b>

Table II: Number of water birds observed at Jhalar lake, Ucchali lake, Khabbaki lake and Kallar Kahar lake.

Common and Scientific Names	Jhalar lake			Ucchali lake			Khabbaki lake			Kallar Kahar lake		
	Jan 2007	Nov 2007	Jan 2008	Jan 2007	Nov 2007	Jan 2008	Jan 2007	Nov 2007	Jan 2008	Jan 2007	Nov 2007	Jan 2008
Little Grebe ( <i>Tachybaptus ruficollis</i> )	22	18	15	28	35	120	78	200	78	135	150	165
Great Crested Grebe ( <i>Podiceps cristatus</i> )	0	0	0	0	15	0	0	40	0	0	5	0
Black-necked Grebe ( <i>Podiceps nigricollis</i> )	0	0	0	0	23	0	0	10	0	0	8	0
Large Cormorant ( <i>Phalacrocorax carbo</i> )	0	0	0	0	0	0	0	0	0	114	120	135
Indian Cormorant ( <i>Phalacrocorax fuscicollis</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Little Cormorant ( <i>Phalacrocorax niger</i> )	3	5	0	0	25	0	8	12	8	54	425	291
Darter or Snake Bird ( <i>Anhinga melanogaster</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Night Heron ( <i>Nycticorax nycticorax</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Indian Pond Heron ( <i>Ardeola grayii</i> )	0	4	0	0	0	0	0	12	0	62	47	65
Cattle Egret ( <i>Bubulcus ibis</i> )	0	0	0	0	0	0	0	0	0	18	0	0
Little Egret ( <i>Egretta garzetta</i> )	15	12	0	0	180	86	13	20	13	48	65	95
Intermediate Egret ( <i>Egretta intermedia</i> )	2	0	0	0	150	0	4	0	4	22	13	26
Large Egret ( <i>Egretta alba</i> )	3	0	0	0	36	42	3	0	3	35	78	94
Gray Heron ( <i>Ardea cineria</i> )	0	0	0	0	41	0	0	0	0	28	65	32
Purple Heron ( <i>Ardea purpurea</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Greater Flamingo ( <i>Phoenicopterus ruber</i> )	0	0	0	31	36	27	0	0	0	0	0	0
Ruddy Shelduck ( <i>Tadorna ferruginea</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Common Shelduck ( <i>Tadorna tadorna</i> )	0	0	0	0	0	8	0	0	0	0	0	0
Eurasian Wigeon ( <i>Anas penelope</i> )	0	0	0	0	1200	335	250	35	250	1545	700	612
Gadwall ( <i>Anas strepera</i> )	0	0	0	54	1700	80	0	96	0	1800	120	70
Common Teal ( <i>Anas crecca</i> )	0	0	0	0	24	4200	0	0	0	500	32	87
Mallard ( <i>Anas platyrhynchos</i> )	0	0	0	350	315	1350	0	0	0	800	780	615

Northern Pintail ( <i>Anas acuta</i> )	40	0	0	28	2300	1500	0	18	0	1200	1350	950
Shovler ( <i>Anas clypeata</i> )	0	0	15	42	1580	635	0	900	0	570	540	360
Red-crested Pochard ( <i>Netta rufina</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Common Pochard ( <i>Aythya ferina</i> )	0	0	31	630	615	625	2,300	2,500	2,300	2050	2200	1800
Tufted Duck ( <i>Aythya fuligula</i> )	0	18	0	0	115	55	0	220	0	9	185	70
Indian Moorhen ( <i>Gallinula chloropus</i> )	16	16	12	0	2	0	0	4	0	150	150	69
Purple Moorhen ( <i>Porphyrio porphyrio</i> )	0	0	0	0	0	0	0	0	0	325	534	570
Common Coot ( <i>Fulica atra</i> )	48	118	70	5200	5400	5650	645	9,600	645	2000	12000	13700
Pheasant-tailed Jacana ( <i>Hydrophasianus chirurgus</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Black-winged Stilt ( <i>Himantopus himantopus</i> )	12	16	18	180	7	15	38	45	38	48	56	67
Kentish Plover ( <i>Charadrius alexandrinus</i> )	0	0	0	48	0	0	0	0	0	0	0	0
Red-Wattled Lapwing ( <i>Holopterus indicus</i> )	12	6	5	25	2	4	3	4	3	6	5	4
Northern Lapwing ( <i>Vanellus vanellus</i> )	0	0	0	0	3	0	0	0	0	0	0	0
Little Stint ( <i>Calidris minuta</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Common Snipe ( <i>Gallinago gallinago</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Spotted Redshank ( <i>Tringa erythropus</i> )	0	0	0	0	0	0	0	0	0	8	0	0
Common Redshank ( <i>Tringa totanus</i> )	0	0	0	0	0	8	0	0	0	0	0	0
Green shank ( <i>Tringa nebularia</i> )	0	0	0	0	0	7	0	0	0	4	0	0
Green Sandpiper ( <i>Tringa ochropus</i> )	15	0	0	35	0	4	5	0	5	3	0	0
Wood Sandpiper ( <i>Tringa glareola</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Common Sandpiper ( <i>Actitis hypoleucos</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Black-headed Gull ( <i>Larus ridibundus</i> )	0	0	0	30	25	39	0	0	0	25	12	35
Gray River Tern ( <i>Sterna aurantia</i> )	0	0	0	0	120	245	0	0	0	42	35	42
<b>Total Number of birds</b>	<b>188</b>	<b>213</b>	<b>166</b>	<b>6681</b>	<b>13949</b>	<b>15035</b>	<b>3,347</b>	<b>13,716</b>	<b>3,347</b>	<b>11,601</b>	<b>19,675</b>	<b>19,954</b>
<b>Total Number of Species</b>	<b>11</b>	<b>9</b>	<b>7</b>	<b>13</b>	<b>24</b>	<b>21</b>	<b>11</b>	<b>16</b>	<b>11</b>	<b>27</b>	<b>25</b>	<b>23</b>

On the contrary, Nammal lake recorded to support a very small number of birds in January 2008 (Table-I) when water level was very high which makes it impossible for dabbling anatids to feed on submerged vegetation.

Ucchali lake used to have dense population of aquatic birds in 1985 (Azam, 1994), however, present study reveals that the bird population significantly declined which may be attributed to low water level in the lake for the past few years. The population of water birds was observed to be increasing in January 2008, which may be attributed to high inflow of water in the lake (Table-II).

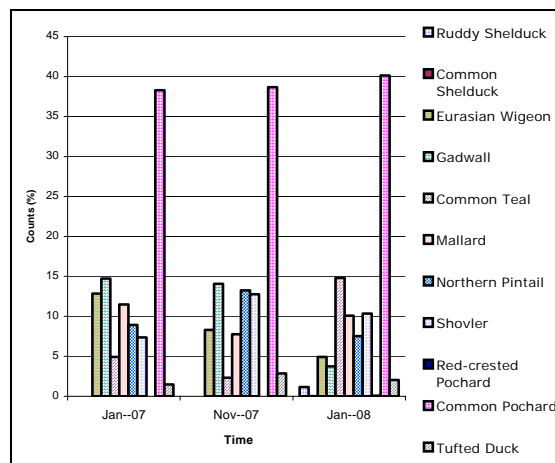


Fig 3: Percent distribution of important Anatids at lakes in upper Punjab (pooled data)

Among water birds, anatids seem to be the most common bird. Common pochard (*Aythya ferina*) was found to be dominant species especially at Chashma barrage (Fig. 3). Its contribution in total population during January 2007, November 2007 and January 2008 was 38.3 %, 38.7 % and 41.1 %, respectively. Ali and Akhtar (2005), Azam (1994), Roberts (1991; 1992) and Scot (1989) considered Ucchali, Khabbaki and Jhalar lakes were important wintering grounds of white-headed duck (*Oxyura leucocephala*) its amazing that during the present study, the species could not be recorded at any of the wetlands of upper Punjab. Similarly, greyleg goose (*Anser anser*) was considered to be a regular winter visitor to Nammal lake (Azam, 1994), however, it was not observed in these water bodies. Ruddy shelduck (*Tadorna ferruginea*) was reported from Jinnah Barrage (Ali and Akhtar, 2005; Chaudhry and Khan, 1998), however, its population was observed to be growing

considerably higher than previous records. In comparison to previous studies, the population of water birds was observed to have decreased during the present study at Chashma barrage and at Nammal, Jhalar and Kallar Kahar lakes whereas sizeable increase in population was noted at Jinnah barrage, and at Ucchali and Khabbaki lakes (Table-I-II).

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**References:**

Ali, Z. and Akhtar, M., 2005. Bird surveys at wetlands in Punjab, Pakistan with special reference to the present status of white-headed duck *Oxyura leucocephala*. Forktail. 21: 43-50.

Azam, M. M., 1994. The Birds of Salt Range. Rec. Zool. Surv. Pakistan, 12: 63-97

Chaudhry, A. A. and Khan A. A., 1988. Waterfowl population on the wetlands of the Punjab. Proc. 8<sup>th</sup> Pakistan Congr. Zool. 8: 229-239.

Hosetti, B. B., 2005. Management of wetland birds. In: Concepts in Wildlife Management (ed. Hosetti, B. B.). Daya Publishing House, Delhi, India. Pp 131-154.

Javed, H. I., 2002. Report on the Asian water bird census 2002 on the wetlands of Sindh and N.W.F.P. Rec. Zool. Surv. Pakistan, 14: 19-26

Robert, T. J., 1991. The Birds of Pakistan - Non Passeriformes. Vol. I. Oxford University Press, Karachi, Pakistan. 598 pp.

Robert, T. J., 1992. The Birds of Pakistan - Passeriformes. Vol. II. Oxford University Press, Karachi, Pakistan. 616 pp.

Scott, D. A., 1989. A Directory of Asian Wetlands (ed.) Gland, Switzerland, International Union for Conservation of Nature and Natural Resources Cambridge, U.K.

Scott, D. A. and Poole, C. M., 1989. A Status Overview of Asian Wetlands. Asian Wetland Bureau (AWB) Publication No. 53. Kuala Lumpur, Malaysia.

Sonobe, K. and Usui, S., 1993. A Field Guide to the Water Birds of Asia. Wild Birds Society of Japan, Tokyo.

Wetlands International, 2007. The Asian Water Bird Census: Development Strategy 2007-2015. Wetlands International, Kuala Lumpur, Malaysia.