



Waterbirds of Tarbela Dam, Khyber Pakhtunkhwa, Pakistan-a review

Qaisar Rahman^{1*}

1. Department of Zoology, PMAS-Arid Agriculture University Rawalpindi, Pakistan

*Corresponding author e-mail: qaisarrahmanjadoon@gmail.com

SUMMARY

Wetlands are important for biodiversity and its adaptation of fauna, and they provide habitat for a range of organisms. Various climate regimes across the country have resulted in a diverse range of wetland systems, from high-altitude frigid wetlands to hot and humid wetlands along the coast. Wetlands serve as a transitional zone between the aquatic and terrestrial habitats, making them extremely important for creatures that live in both water and land. Furthermore, because these are the most productive sites, they supply food for practically all aquatic birds. Pollution, industrialization, agriculture intensification, and urbanization are all anthropogenic influences that have a negative impact on life in these locations.

Keywords: Wetlands, Waterbirds, Biodiversity, Fauna

Citation: Rahman, Q. 2021. Waterbirds of Tarbela Dam, Khyber Pakhtunkhwa, Pakistan-a review. International Journal of Forest Sciences. 1: 147-170.

INTRODUCTION

Wetlands are essential areas for biological diversity and adaptation of both land and aquatic animals, and they provide habitat for a range of organisms. Wetlands are classified according to their age, chemical composition, location, and size. Pakistan boasts a diverse range of climatic and vegetation zones despite its modest size. Various climate regimes across the country have resulted in a diverse range of wetland systems, from high-altitude frigid wetlands to hot and humid wetlands along the coast. Pakistan has about 225 wetlands, 19 of which are internationally significant. Pakistan's wetlands comprise 780,000 hectares, accounting for 9.7 percent of the country's total area, with 74 percent freshwater and 26 percent coastal wetland areas (IUCN, 1989; Gorham and Janssens, 1992; Altaf *et al.*, 2014).

While the world's vulnerable birds are in desperate need of conservation, the diversity patterns are challenging to track and monitor (McKee *et al.*, 2004; Vié *et al.*, 2009; Ali *et al.*, 2018; Ashraf *et al.*, 2018; Jadoon *et al.*, 2019; Mughal *et al.*, 2020). The rate of extinction of biodiversity will continue to rise, until, in addition to explicitly measuring biodiversity, information about habitat characteristics that may influence species diversity is not taken into account while protecting the species. Ornithologists employ a standard habitat metric that is measured in the field (Cody, 1981; Pidgeon *et al.*, 2001). Main reason of the biodiversity loss is human involvement in nature and natural resources (Hakeem *et al.*, 2017; Rauf *et al.*, 2017;

Umair, 2018; Ali *et al.*, 2020). Wetlands serve as a transitional zone between the aquatic and terrestrial habitats, making them extremely important for creatures that live in both water and land. Furthermore, because these are the most productive sites, they supply food for practically all aquatic birds. Pollution, industrialization, agriculture intensification, and urbanization are all anthropogenic influences that have a negative impact on life in these locations (Ali, 2005; Altaf *et al.*, 2013; Ashraf *et al.*, 2019; Ali *et al.*, 2020).

GADWALL

Gadwalls (*Anas strepera*) are mid-sized (40-44 cm) ducks characterized by; Color of body grey, have blackish rear parts; White speculum and black portion on wing coverts are displayed. Male is grey-brown with a black patch at the tail. It has black rear end, dark grey bill, yellow feet and white patch on secondaries which is often visible at rest. Female gadwall are similar to males, have dark mottled brown body, yellowish bill with dark spots and white speculum. In flight, shows white patch on inner secondaries, contrasting with black outer secondaries and inner greater coverts, purplish-chestnut patch on median coverts, and grey flanks contrasting with white belly. Normally found in small parties. Habitats are freshwater marshes and lakes with extensive aquatic and emergent vegetation (Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

COMMON TEAL

Common Teal *Anas crecca* is a small dabbling duck with body size 34-38 cm. Female: pale, dark mottled; white shoulder stripe; speculum green. Male has dark chestnut head, bottle-green band behind eye, white stripe along scapulars, and yellowish patch on under tail-coverts. Male has distinctive, soft, throaty whistle. Female usually silent, but utters a sharp quack when flushed. Found in both small and large flocks. Feeds by dabbling, head-dipping, upending, also by grazing on marshes and by night-time foraging in fields with other dabbling ducks. Found on all kinds of shallow wetlands, including marshes, pools, lakes and rivers, and also on brackish waters (Grimmett, 1998; Mirza and Wasiq, 2007).

MALLARD

Mallards (*Anas platyrhynchos*) are large, heavily built dabbling duck with body size range from 50-65 cm. Both sexes have bright orange feet and a purple blue speculum. Breeding male has bottle-green head, purplish-chestnut breast, mainly grey body, and black rear end. Female is pale brown with darker crown and eye-stripe; has diffusely spotted or mottled breast, and dark brown subterminal and buff terminal fringes to feathers on upperparts and flanks. Often flights at dusk to flooded paddy-fields and marshes, where it feeds by dabbling, head dipping, grazing or upending. Their diet mainly consist of seeds of grasses, pond weeds and other aquatic vegetation. They also eat mollusks, insects, small fish and tadpoles etc. Winter visitor breeds in small number in Himalayas in Kashmir (Grimmett *et al.*, 2008).

NORTHERN PINTAIL

Northern pintails (*Anas acuta*) are thin, long (51-56 cm) and elegant dabbling duck with long grey bill, narrow wings and elongated central tail feathers; earning named of pintail. The pointed tail held cocked when swimming. Male have a chocolate brown head with white stripe in the longish neck, two long black central feather, blackish grey back with white patch on rump and greenish black speculum is displayed. Female have dark-brown upper body; head and lower body greyish; tail pointed and speculum is a dull brown. Highly gregarious, forages at night and in the early morning in marshes and flooded paddy-fields, flying back to roost at a daytime refuge. Feeds mainly by upending, dabbling and head-dipping in shallow water; also grazes on land. Found in open waters with aquatic vegetation, freshwater marshes, brackish lagoons, estuaries, wet paddy-fields (Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

NORTHERN SHOVELER

Northern Shoveler *Anas clypeata* medium-sized (44-52 cm) dabbling duck with long spoon-shaped bill, widen toward the tips in both sexes. Legs and feet are orange. Male: head and neck iridescent green; white chestnut; breast and hind flanks white; black rear end, and long down curving black-and-white scapulars. Female: mottled brown head with blackish crown and brownish speckled body. Usually silent. Sociable; usually keeps in pairs or small parties. Feeds on aquatic organisms like insect larvae, worms, crustacean, molluscs and aquatic seeds. Frequents in all types of shallow fresh waters and very rare in coastal areas (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

RED CRESTED POCHARD

Red crested pochard (*Netta rufina*) is 21-23 inches long and weight up to 1kg. Male has a rounded orange head, red bill, black neck and breast, sides white. Female is mostly brown with dark brown head, bill blue grey, throat and cheeks white. The nest is constructed on the ground in dense vegetation near water. Female lay 8 to 10 pale green eggs and incubate them alone for 26-28 days. They are diving ducks because they dive to get the feed like seed, aquatic plants that they eat (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

COMMON POCHARD

Common Pochard *Aythya ferina* are diving ducks have mid-sized (42-49 cm) body length, large dome-shaped head. Drake: rufous head, pale grey body; black breast and broad pale bluish band on bill. Female: blue band on fore-bill; buff at the base of the bill and around the eye; diffuse pale head; body grey brown; In all plumages, flight feathers are silvery-grey show white wing-bar. Silent away from breeding grounds. Highly gregarious, often gathering in flocks of several hundred. Vegetarian, comprising aquatic plants, algae, seeds also occasionally molluscs, insect larvae, fish and tadpoles. It is mainly a nocturnal feeder. Found in reservoirs with large areas of open water deep enough to allow diving; occasionally on rivers and rare near coastal areas (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

TUFTED DUCK

A small diving duck with largish head and thick neck. Tufted Duck *Aythya fuligula* has body length 40-47 cm ; weight range from 550-820g; bluish grey legs with darker webbing; bluish grey beaks with dark hooked tip and yellow irises. Drake: long drooping black crest; black head, neck, back and tail; white bright flanks and bellies. Female: head short, dark brown body; whitish undertail coverts. Eclipse male and immature male are duller brownish-black on head, breast and upperparts; have greyish flanks, duller grey bill, and crest which is shorter or apparently lacking. Silent away from breeding grounds (Mirza and Wasiq, 2007). Gregarious; sometimes in flocks of several hundred. Feeds in the daytime, mainly by diving or upends. Found in lakes and irrigation reservoirs with large open areas and deep enough to allow diving (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GARGANEY

Garganey (*Anas querquedula*) is a small dabbling duck with body size ranging from 37-41 cm. Male: white strip behind eye curving down toward the neck, brown head and breast; The rest of the plumages are grey and have grey bill and legs. In flight it shows a pale blue speculum with a white border. Female: brown color, pale eye brow, dark eye line, pale spot bordered by a second dark line; feed by skimming rather than upending, found shallow ponds, lakes and marshes. Male has a peculiar crackling mating call (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

EURASIAN WIGEON

Eurasian wigeon (*Anas Penelope*) has body length 45-51 cm with pale blue bills with black tips. Male: yellow forehead and forecrown on bright chestnut head, pinkish breast, grey mantle and flanks, belly and sides of the rear body behind the flanks are white contrasting with black vent. In flight, white shoulder patch and green speculum are displayed. Legs and feet are blue grey. Female; have grey brown to russet brown head, neck, chest, back, sides and flanks. In flight, all plumages feature prominent white belly contrasting with uniform breast and flanks, and pointed tail. Male has a distinctive whistled wheeooo and female a low growled krrr (Madge and Burn 1988). Aquatic grazer; on pondweeds, waterside grass land and in wet paddy field; grazes more than other ducks. Frequently found in lakes, reservoirs and rivers, also pools, marshes, tidal creeks and salt marshes (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

COMMON GOLDEN EYE

Common Golden eye *Bucephala clangula* have mid-sized body length 41-49 cm, short neck, round body, short and grey black bill, bright amber iris. Male; iridescent dark green head, oval white patch at hind base of bill; Brilliant white breast, belly and secondaries contrast with black back, wings, and tail. Females and immature male: have brown head, indistinct whitish collar, grey body, with white wings patches usually visible at rest; Wing beat is rapid with a relatively deep arc; produces

distinctive "whistle" (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

COMMON SHELDUCK

Common shelduck (*Tadorna tadorna*) is a large sized duck about 57-66 cm in length, goose like appearance; head dark green, sides and back white in color, bill red, legs pink, breast chestnut like band start from neck back to beginning of the wings. Female is very similar to male, but female is generally duller and lack little knob on the bill before forehead but Drake have the knob on the bill. In flight white upper wing and under wing coverts contrast with black remiges in all plumages; feed on insect larvae and pupae under rocks, also on aquatic animals like small fish, snails and crabs and plants materials and seeds (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

RUDDY SHELDUCK

Ruddy Shelduck *Tadorna ferruginea* is distinctive species of dabbling duck, 58-70 cm long with a wingspan of 111-136 cm; body rusty orange with buffish head; white wings with black rectrices and have black bill. Female is similar to male, but drake has a black ring at the base of neck and female often has a white face patch. Normally social, with males giving loud honking calls and females responding with deeper *aughaugh* call. Frequent winter migrant to Indus plains. Swim well, flight like a goose than a duck. It is mainly nocturnal, omnivorous feeds on grasses, shoots of young plant, seeds and on aquatic invertebrates (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

FERRUGINOUS DUCK

Ferruginous Duck *Aythya nyroca* is smallest duck with body length 37-41 cm; head dome shaped, rich rusty brown on head, breast and flanks; white under tail coverts; long grey bill. Male has pale iris while female has dark iris; also female is duller than male. In flight, shows extensive white wing bar and white belly. Inhabits lakes, marshes surrounding reeds; shy and hidden in reeds; feed mainly at night by diving and dabbling, eat aquatic plants with some mollusks, insects and small fish (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

SMEW DUCK

Smew (*Mergellus albellus*) is small (36-44 cm) and one of the beautiful diving duck with a delicate bill. It is about 500-800 g in weight and wingspan is 55-69 cm. Drake: white body with black patch around eye, as well as black band on the head and along the flanks; rest of body is pale grey. Female: body grey with reddish brown head and white cheek with black eye. In flight, it show black and white wings. Female and juvenile smew is similar and indistinguishable from each other. Feed; mainly on insect larva and other insects and small fish. It is scare winter visitor (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREYLAG GOOSE

Graylag goose (*Anser anser*) is large in sized with 74-89 cm long and 3kg in weight; long neck, brownish grey body, big pinkish orange bill and legs. In flight show pale grey forewings, upper tail coverts white. Male and female are mostly similar but females have brown patches on the neck, lower breast and sides. Occasional flocks staying on the larger lakes or barrage or marshs pond. Winter migrant and enter Pakistan through river Indus. Feed on grain, roots, bulb, few insects and snails etc (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

GREATER WHITE FRONTED GOOSE

Greater White Fronted Goose *Anser albifrons* has body length 64-85 cm and weight 1.92- 3.32 kg with brown color, a white band at head front, black barring marks the belly, under tail is white, pinkish orange bill and orange legs and feet. Juveniles lack black barring on belly and white frontal band on head. Both male and female are similar in appearance. Head white frontal band, black barring marking on belly and orange-pink bill are best distinctions from Bean Goose. During migration feeds in lakes, ponds and wetlands. In flight, groups fly in “V” formation or in single file. Rare vagrant to Pakistan along the Indus river (Harris et al., 1989). Assembles in considerable number where there is ample food and relative freedom from disturbance. Diet includes vegetarian, comprising aquatic plants, algae, grasses, seeds, and occasionally aquatic animals. Recorded near wet grassland and crops, lakes, large rivers and very rare in coastal areas (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

COMMON MERGANSER

Common merganser (*Mergus merganser*) is a diving duck (59-73 cm) with smooth body and thin red bill. Drake: head dark green and crestless, white body with peachy blush belly, breast and flanks; grey rump and black back; bill red and eye dark in color. Female and immature male: head reddish brown has short crest, grayish body with a white chin patch at the throat. Juveniles are also similar but have white bar across the face. Prefer fresh water, feed by diving to catch fish in river, lakes and large ponds. Rare winter visitor, often form rafts or floating flocks in winter (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

COTTON TEAL

Cotton teal *Nettapus coromandelianus* is smallest waterfowl on earth with body length 29-36 cm and weight 160 g. In plumage white is predominates, short bill and goose like in appearance so called Indian pygmy goose. Drake: white rounded head, neck and under parts, black collar and white wing bar, dark crown and eyes, short legs. In flight, male wings are green with white band making the male conspicuous. Female: pale body color without black collar, strong dark eye line and white wing bar. In flight, females have thin white edges on wings. Eclipse male and female have dark strip through eyes. Inhabits fresh water lakes with extensive floating vegetation; feeds on seeds, crustaceans, insects and other vegetation (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

LITTLE GREBE

Little grebe (*Tachybaptus ruficollis*) is small sized diving bird of wetland about 25-29 cm. both male and female are similar, rounded head, small puffy rear up, tail-less and short pointed bill. In winter drab brown, whitish chin; rufous pale neck; under part whitish. In summer dark brown; chestnut sides of the head, throat and neck; yellow patch at base of bill; pale under part and dark above. Juvenile; yellow bill with small black tip, black and white streaks on the cheeks and sides of the neck. Shows whitish secondaries in flight. It is seen mainly single or in pairs in small loose flock among aquatic vegetation during breeding; in the non-breeding season easily seen on open water. Often sleeping during the day. Horse whinnying call confined to breeding season. Mostly feed on fish and aquatic invertebrates. It is confined to various habitats like lakes, ponds, reservoirs, ditches, and slow-moving rivers. Their breeding season varying locally and their nest is a mass of weeds. It is common wide spread resident in all over Pakistan (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREAT CRESTED GREBE

Great Crested Grebe *Podiceps cristatus* is the largest member of the grebe family with body length about 45-51 cm, wingspan 58-72 cm and weigh is 1-1.5 kg. Sexes are alike, with large body, long slender like neck and triangular-shaped head. In adult breeding plumage; has rufous orange ear tufts; and white cheeks and fore neck with black crest. In adult non-breeding plumage; has white cheek and fore neck with dark line through eye. In flight, appears very awkward, with arched back, large dangling feet, long thin neck, and rapid flight action; has two prominent white patches on wing. During swimming body low in the water and neck held erect. Both sexes perform striking, ritual courtship displays. Feed on fish and aquatic invertebrates. Prefer open water like lakes, river and reservoirs. Breeding observed in the month of June-August. Nest is a floating mass of piled-up weeds, loosely anchored to vegetation. Mainly scarce and winter visitor occasionally breeds in small numbers in Pakistan (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

LITTLE CORMORANT

Little cormorant (*Microcarbo niger*) is small size about 50-53 cm in length, rectangular head, short bill. In breeding season, adult breeding cormorants are mainly black, head white plumes, whitish throat; wings are silvery and have long tail. Non breeding; browner, lack white head plumes and have white chin. Male and female look alike, It breeds in fresh water wetlands and laid 3-5 eggs in a nest in a tree or long grass. Feed by diving in fresh water and usually feed in shallow water on fish and sometimes also crustaceans and amphibians. It is abundant resident bird (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREAT CORMORANT

Great cormorant (*Phalacrocorax carbo*) is a large bird, measuring about 80-100 cm body length and weighing 1.8 to 2.8 kg. Adult breeding; Black body color; white

throat patch and yellow throat pouch; long tail. Female cormorant is slightly smaller than male cormorant. In flight, looks heavier, with thicker neck and slower wing action. More blackish-brown in coloration than Indian, with more clearly marked and extensive white chin. It does usually remain silent (Cramp and Simmons 1977). Usually found singly or in small groups, although sometimes joins fishing flocks of other cormorants. Gathers in large numbers to breed, and often roosts communally in winter. Preferring habitat include coastal waters, salt pans, reservoirs, jheels, and large inland lakes and rivers in the Himalayas and lowlands. Its breeding season start from September-February, depending on water conditions. Build nest as a platform of trees but in some places they nest on the ground. Clutch has three to four eggs. Abundant; most birds breed and are local migrants, some are winter visitors (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREAT WHITE PELICAN

Great white pelican (*Pelecanus onocrotalus*) is a huge white bird measures, body length 140-175 cm, weighs 9- 15 kg. its bill length is 350-450 mm and wingspan is 220-350 cm. male is larger than female pelican. Breeding adult and immature have whitish plumage, flattened horn on the upper mandible and black underside to primaries and secondaries. Adult breeding has white body and wing covert tinged with pink, bright yellow pouch and pinkish facial skin around eye. Adult non breeding has duller bare parts and lacks pink tinge and white crest. Immature have grey wing coverts and scapulars. Juvenile has largely brown head, neck and upper parts. During flight, long neck is folded back on its body, and its black primaries and secondaries contrast with the rest of the wing. They inhabit in shallow water bodies surrounded by dense vegetation and feed mainly on fish but also feed on small birds, frogs, cray fish and salamander. They are uncommon winter visitor to Pakistan (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

INDIAN POND HERON

Indian pond heron (*Ardeola grayii*) is a small bird have body length is about 42-45 cm. both sex look alike; chestnut head and neck, belly and tail white, eyes are yellow. Adult breeding plumage: yellowish head, neck and breast, dark reddish brown back, with long feather covering up to tail; crest buff with white long plumes. Non breeding plumage: Head, neck and breast streaked olive and brown. In flight adult appear white due to white under part and tail. Forage in marshes, flooded paddy fields, ditches and lakes. Although usually solitary but will gather in large numbers where food is plentiful like dry out pool to feed on stranded fish. It is local breeder and breed in small groups in isolated large trees or clumps almost in all months. For breeding, close to water is not necessary, often nesting in the middle of a town or village. They are common, abundant, and resident bird species (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

WESTERN REEF HERON

Western Reef Heron *Egretta gularis* is medium sized heron, body length measuring 55-65 cm and weighing 300-700g. Indus delta populations of heron occurs as three or four color morphs: all white with yellow bill morph; all slaty with white throat patch

morph, dark purplish grey with prominent white carpal wing-patch morph, pale ashy grey with throat and lower belly white morph. White morph can be extremely difficult to separate from little egret. Bill is large and color is also different in various morph. It is usually yellowish or brownish-yellow, but may be black in breeding season. They inhabit marshes, creeks, rocky shores, sandy shores, reefs and mangroves. They feed on fish, crustacean, mollusks and earthworm. They stalk the prey by standing still in shallow water and sometime they are seen stirring water with foot to flush out the prey. These herons construct nests on reed beds, mangrove trees and in bushes. Usually breed in late March-August but varying on locality. They breed in own colonies or mixed with other waterbirds but usually they are sedentary and disperse widely. These are abundant, locally common resident in Pakistan in the monsoon (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

LITTLE EGRET

Little egret (*Egretta garzetta*) is a slim, medium sized (55-65 cm), dimorphic heron with long neck and bill, leg dark and yellow feet. In breeding, plumage has prominent plumes on head, chest, back and red lores. In flight, legs extend beyond tail, and look less compact, with more pronounced neck bulge, compared with Cattle Egret. In nonbreeding, short plumes may occur on back and chest. Male are larger than female, juveniles are smaller than adult. Normally remain sedentary but during foraging found in flocks, and more sociable than the two larger egrets. They inhabit variety of habitat such as lakes, flowing river and stream, irrigation canals, flooded paddy fields. Breeding colonially with other herons and cormorants. Built nest of twigs in a solitary tree upto 20m high or in bushes and reeds. Breeding season is November-September, varying locally. Common and widespread distributed in Pakistan, and mainly resident; and irregular year-round visitor in some places (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

INTERMEDIATE EGRET

Intermediate Egret *Mesophoyx intermedia* is intermediate in size (65-72 cm) between great egret and smaller white egrets like little egret and cattle egret. Body have white plumage, yellow bill but become black in breeding season, legs and feet black. It has crest to hind crown and nape. Both sexes look alike. Adult non-breeding and juvenile lack plumes; lores are pale yellow; bill is yellow, often with pronounced black tip. Feed on fish, crustaceans and insects etc. Normally silent; gives distinctive buzzing calls during display (Hancock and Kushlan 1984). Nest in mangrove forests, breeds in November-May and July-September. A typical diurnal, in small flocks, which separate when foraging. Found in marshes, flooded grassland, well-vegetated pools; and estuaries, mangrove swamps and tidal creeks. Commonly irregular year-round visitor and locally resident (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREAT EGRET

Great egret (*Casmerodius albus*) is a large wading bird. Its body length is 65-72 cm; pure white body plumage, have long and yellow bill, dark legs and feet. In breeding

plumage; adult have long plumes arise from their tails. It is generally confused with intermediate egret, although appearing much larger. Often has a very erect posture, holding its long neck upright. Compared with Intermediate, usually looks smaller-headed and longer and thinner necked ; bill yellow, black tipped, legs brownish black; appears larger and longer. In flight, appears heavier and slower, with more prominent neck kink. Normally appear silent. Mode of life is diurnal, usually less sociable and is often solitary. Roosts communally. Found in river, jheels, lakes, marshes, estuaries and mangroves. Fish is their primary food but also eat crustaceans, frogs and other aquatic creature. Breeding time start from November-May and July-September, varying on locality. It is common and winter visitor bird (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREY HERON

Grey heron (*Ardea cinerea*) is a large wading bird; body size 90-98 cm, tall 100 cm, grey in color; head white, black crest; Adult: yellow bill, whitish head, whitish neck with bluish-black streak on the front, black crest, plumage; upper wing covert ashy grey, grayish white lower wing covert, black patches on the flank; scapular feather are elongated. Immature: immature has dark cap with variable crest, grayish neck, lack or reduce black on belly, long and brown legs. In flight, upper wings grey coverts contrast with grayish-black flight feathers. At a distance and in flight, compared with Purple Heron, kink of neck is less obvious, feet are smaller, and dark grey under wing coverts. It is diurnal in habit and usually keeps singly during feeding but gather occasionally in suitable feeding habitat. Grey heron found in different watery habitat like lakes, rivers, marshes, jheels, ponds, estuaries, ditches, flooded area, mangroves, tidal creeks, coastal lagoons and coral reefs. Feeds in shallow water; on fish, amphibians, small mammals, insects and also on juvenile birds such as ducklings. Breed throughout the year in colonies usually in high trees close to wetland, also in low trees, nesting also bushes and reed beds (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

CATTLE EGRET

Cattle egret (*Bubulcus ibis*) is a small sized bird about 48-52 cm in length, usually found near grazing mammals. Juveniles and non breeding adult: pure white plumage, dark short legs, yellow bill. Breeding adult: plumages orange buff on head, neck and mantle; orange bills and reddish orange legs. Cattle egret prefer varying habitat, found associated with live stock. Breeding habitat is similar to other herons and egret in colonies near water bodies. Built nest stick nest in large trees or in shrub. It is found alone or in groups. Feeds mainly insect like grasshopper and parasitic flies. It follows cattle to take the advantage of insect stirred up in their walk. abundant and widespread; local resident species (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

BLACK CROWNED NIGHT HERON

Black crowned night Heron *Nycticorax nycticorax* is medium sized heron measuring; body length 58-66 cm, weight 728- 1015g. Adult: black crown, pale grey bellies and wings, black back, red eye, white face with a black cap, whitish under part, topped by

a white plume and short yellow legs. Immature: dull grey brown plumage on head, wings and back with numerous pale patch. Resembles juvenile but has unstreaked brown mantle/scapulars. Inhabit a variety of freshwater wetland. Feeding is varied, especially prefer fish in diet. During foraging, stand still or walk slowly in shallow water, waiting for their prey; Very noisy in nesting colony, highly gregarious, common resident, breeding colonially. Some migrate to breed in northern areas with other waterbirds.

LITTLE HERON

Little Heron *Butorides Striatus* is small heron measuring 40-48 cm, stocky and short legged heron. Adult: has black crown and long crest, dark greenish upper part and grayish underparts. Juvenile: has buff streaking on upper parts, and dark streaked under parts. Grey heron found in different watery habitat like lakes, rivers, marshes, ponds but preferring pools and well vegetated channels. Foraging in shallow water on small fish, frogs and aquatic insects. Some time they use bait, dropping a feather or leaf carefully on water surface and picking fish that come to investigate it (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

EURASIAN SPOONBILL

The body length of Eurasian spoonbill (*Platalea leucorodia*) is 80-90cm and weighs 1.8kg-2.4 kg. Body Plumage is largely white; bill characteristic with spoon like shape. Adult: black bill with yellow tip, black legs; has crest; yellow breast-patch. Juvenile: bill and legs pinkish, black shafts to secondaries and black tips to primaries feather. Male are larger than females with long bill and legs. Usually prefer large lakes and rivers where it can forage in shallow water in the morning, evening and at night. Feeds on mudflats, small fish and other aquatic invertebrate. Usually remain silent in colonies but Prefer to live in small flocks, often with other large waterbirds. Breed in mixed colonies with other waterbirds. Resting much of the day Spends on one leg or for sleeping with the bill tucked under the wing (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GLOSSY IBIS

Glossy Ibis *Plegadis falcinellus* body length is about 55-65 cm with a wing span of about three feet. Long Bill, dark grey in color and curved down. Adult breeding: deep chestnut, glossed with purple and green, and metallic green and purple wings; has narrow white surround to bare lores. Adult non-breeding: duller, white streak on dark brown head and neck. Juvenile: similar to adult non-breeding but is dark brown with white mark on head and faint greenish gloss to upper part. Inhabit variety of wetland such as marshes, flooded field, swamps and estuaries. For foraging, probes in the mud and silt looking for prey like the crab, small fish, insects and small snake. Built nest in trees or in bushes, breed in colonies with other ibis, egrets and herons. Vary territorial during nesting (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

LESSER FLEMINGO

Lesser Flamingo *Phoeniconaias minor* is smallest flamingo about 80-90 cm in length and about 1.2-2.7 kg in weight. Body; short neck, small bill have kinked. Adult: bill deep dark red with black tipped; iris and facial skin dark red; head, neck, legs and wing coverts are deep rose pink; primaries and secondaries upper wing coverts paler pink of the rest of the coverts; in height male is taller than female. Immature: head and neck grayish brown, body pale pink and mainly pink covert; Bill coloration depends on increasing age. Juvenile: body grey brown; bill purple brown with dark tipped; legs grey in color. Mostly nocturnal; flock in the form of v-shaped; Forage mostly on blue green algae and diatoms but also consume crustaceans and small insects. breeds; on undisturbed alkaline lake or coastal lagoons, less uncommon (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

PURPLE SWAMPHEN

Purple swamphen (*Porphyrio porphyrio*) is chicken-sized bird, have body length 45-50 cm and weighing 0.85-1.05 kg. Adult: head and breast purple blue; wings dark green; tail short and shiny white underside feathers; legs long, scaly and orange red; bill red and have frontal red shield. Sexual dimorphism; male larger than female. Juvenile: grayish and also have duller bill and legs. Prefer marshes and swamps habitat with consistent water level. Feed on soft shoot of reed and rushes, small animal like frogs, snails. Spend most of time on the ground and not like to live on trees. Breeding; nesting in interwoven reed bed (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

WATER RAIL

Water Rail *Rallus aquaticus* is medium sized rail, 23-28 cm long with weigh 114-164 g. Adult: upper body part brown with black streaks; sides of head and belly are dark slate blue; barring black and white on flanks; bill long and slightly down curved with red at the base; legs pinkish. Sexes are alike, although male is slightly larger than female. Juvenile: buff coloration to underpart with darker bar; white chin and throat; eye, bill and leg are dull in color. Inhabit slow moving fresh or brackish water, tall dense vegetation including common reed, irises or sedges. Foraging; omnivorous, although feed mainly on animals, including leeches, worms, small crustaceans, spiders and insects larva. Breeding; nest mostly build by male in a single day, season march to june, monogamous and highly territorial during breeding (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

COMMON COOT

The body length of Eurasian coot (*Fulica atra*) is 36-38 cm and weigh 750-900g. Adult: blackish with white bill and white frontal shield; large dull greenish leg with pale base; Sexes are alike;. Shows paler trailing edge to secondaries in flight. Juvenile: paler grey-brown, with whitish chin, throat and breast; greyish-white bill, has brown irides, and indistinct shield. Immature: Similar to adult, but duller, with whitish throat and paler greyish underparts. Gregarious, especially in winter season. Diurnal and not shy. Prefer lake and open water with marginal vegetation. Forages: feeding chiefly on aquatic vegetation in open water, mainly by diving; also by sieving

plant material from the surface. Breeding: build nest is a large mass of vegetation among reeds, a little above water ;Breeds in May-December, varying locally.Abundant and widespread winter visitor in Indus basin; occasionally breeds (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

COMMON MOORHEN

The body size common moorhen (*Gallinula chloropus*) is 32-35 cm. Adult: sex alike; Body Olive greenish black; forehead have red shield; bill with yellow tip; whitish under tail covert and whitish line along flank; long legs and toes with olive green. Juvenile: duller brownish bill and legs. Inhabiting all kinds of wetlands with reed cover, like marshes, village tanks and ditches with emerging aquatic plants. Avoid large and open water area. Forage: omnivorous, feed on various invertebrate and on aquatic vegetation. Breeding: nest in a large mass of aquatic vegetation like reed-beds, breed in March-September, varying locally. Advertising call is a loud, explosive and a soft, muttering territorial call also produced (Cramp and Simmons, 1980). Found singly in pairs or in small parties; in winter may gather in flocks of 50 or more (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

RUDDY BREASTED CRAKE

Ruddy breasted crake (*Zapornia fusca*) is about 21- 23 cm long. Adult: Body flattened laterally; chestnut head and underpart; pale brown back; black and white barring on under tail and flank coverts. Red legs and feet; long toes and short tail; bill yellowish and eye red. Sexes are alike. Juvenile: dark-olive-brown, with white barred under-tail-coverts and fine grayish- white barring on underparts. Prefer marshes and wet paddy fields. Forage; In mud and shallow water for shoot, berries, insect and snail (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

WATER HEN

The body length of this *Amaurornis phoenicurus* is about 31-33 cm. Adult: dark grey upper part and flanks; white face, neck and breast; cinnamon color belly and under tail. Body laterally flattened; Sexes are similar, but female is slightly smaller than male; bill and legs yellow, tail short and long toes. Juvenile; much duller than adult versions. Tail is held up and jerk as they walk. Inhabit marshes and thick cover close to pools, lakes and ditches. Feeding; probe bill in mud or shallow water, prefer insects, small fish, aquatic invertebrate and seed grains. Nesting season is from June to October but varies locally. Noisy crepuscular choruses, *kurrwarh-kurrwah*, breaking into *kwokkwok-krrroowok-oowok* (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

WATER COCK

The body of water cock (*Gallicrex cinerea*) is flattened laterally and have long toes and short tail. Breeding male: body length 43cm, weigh 476-650g; black grey plumage; bill red with yellow tipped; red frontal shield and horn. Non-breeding male: buff color, darkening as they mature; bill yellow and legs green. Female: body length 36 cm and weigh 298-434g; upper body dark brown and lower part paler with fine

barring. Juvenile has uniform rufous –buff under-parts and rufous-buff fringes to upper parts. Inhabited marsh and flooded field and nest in dry location on ground in marsh vegetation .forage on ground, mainly eat insect, small fish and seeds. Noisy bird, especially at dawn and dusk with a loud calls, *qhumb-qhumb qhumb*. Uncommon,summer breeding visitor in the area (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

COMMON CRANE

It is medium sized crane (*Grus grus*) about 100-130 cm long, wingspan180-240 cm and 3-6.1 kg in weight. Adult: overall body slate-grey; Forehead and lores are blackish with bare red crown; white stripe behind eye upper back; primaries, tips of secondries, alula, tip of tail coverts are all black; greater coverts droop into explosive plumes. Juveniles: brown marking on the upper part, with buff or grey head and neck. Males are slightly heavier and larger than females. Forage on cultivated land or in shallow water, food include seeds, fruits, leaves, rhizomes and stem tubers; animal food include, dragonflies, snails, earthworms, spiders, millipedes and small birds. Winter visitor and migration flock in a “V” formation. Scare passage migrant and number declining due to heavy hunting pressure (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

EURASIAN OYSTERCATCHER

The body length of Eurasian Oystercatcher (*Haematopus ostralegus*) is 40-46 cm. Body parts: Upper part black; lower part white; bill long, compressed and orange in color long; stout pinkish legs; red eye and eye ring. Adult breeding: has black neck and breast contrasting with white below. Adult non-breeding: has white collar on foreneck and duller bill. Juvenile: has no white collar and has brownish-black upperparts with white-buffish fringes; has dull yellowish-brown bill. Strong and white flight with shallow wingbeats. Mainly inhabited in sandy and rocky area, and coral reefs. Feeds: eat mainly on bivalve molluscs, marine worms and small crustaceans. Abundant winter visitor, with a few non-breeders staying over the summer (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREAT THICK-KNEE

Great thick-knee (*Esacus recurvirostris*) is a large wader sized 49-54 cm. upper body part greyish sandy ; lower part white; bill black and yellow slightly upturned; eyes large and yellow; black bands below the eyes; legs long yellowish green. At rest, white forehead and spectacles contrasting with black ear-coverts and prominent black and white bands across wing-coverts. In flight, shows grey-mid-wing panel and white patches in primaries. Call is a loud and harsh. During the day usually at rest in full sun close to the water's edge. If disturbed, relies on camouflage, and then either runs off or flies away from the spot in a jerky fashion. Mainly active in dusk and during the night. Inhibit favour marshes or grassy and stony bank along estuaries and rivers. In Food, prefer mainly molluscs, crabs, various insects and small fish, amphibian, reptiles, small mammals and birds' eggs. Breeds in February-Jun (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREY PLOVER

Grey plover (*Pluvialis squatarola*) are 27-30 cm in length and 190-280 g in weigh. Adult: black and white spotted on back and wings. Black stripe from forehead, over the eyes to ear coverts. Another white stripe from forehead, above the eyes; throat to breast; rest of the under parts white. Breeding plumage: Black scalloped with white above; black below except vent; white on forehead extending above the eye to the sides of neck and breast; legs and bill black. Usually less gregarious; often in pairs or small groups and in the colonies of other wader species. Mainly prefer coastal, in intertidal zones of sandy shores and mudflats, tidal and mangrove creeks; also inland on lakes and pools. Common winter visitor to coastal area but occasionally recorded on the margins of inland lakes (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

SNOWY PLOVER

Snowy Plover *Charadrius alexandrinus* is small sized, about 15-17 cm long and weighing around 4 g. sexes are alike; pale plumage, dark patch on sides of breast, below white, back grey/brown, dark legs and bill. Adult breeding: males have black head bar, dark breast bands, black ear coverts, rufous nape and crown; females paler in such areas. Prefer alkali lakes, marshes and coastland. During feeding, keep in flock with other wader scatter in wide area. Breeds season is March-August, varying locally. Nesting; slight depression in a dry river bed, bund, heap or saltpan, or on seashore. Breeds locally in Pakistan, mainly resident and common in lower Sind, fairly widespread in Punjab and kpk in winter, locally and erratically distributed elsewhere (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

LESSER SAND PLOVER

The body size of lesser sand plover (*Charadrius mongolus*) is about 19-21 cm. Breeding male: have sandy grey back; under part white; white stripe over the forehead and eyes; black eye mask; chestnut breast, forehead and nape; dark legs and black bill. Breeding female: duller in color than the male. Difficult to distinguish from greater sand plover, but lesser usually has stout bill, dark legs, white forehead and white wing bars. During feeding, keep in flock with other wader scatter in wide area. Inhibited lakes and marshes area. Winters on coasts, also on rocky and sandy shores; rarely on lakes and rivers inland on passage. Feeding; on insects, crustaceans, annelid worms; getting by a run and pause technique, rather by steady probing. Breeding season; in June-mid July. Nesting; slight depression on dry margins of marshes or lake. Abundant winters visitor. Arrival begin in early August, most leaving by late May; some birds in over summer (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

RED-WATTLED LAPWING

Red-wattled Lapwing *Vanellus indicus* is a large wader, about 32-35 cm long. Sexes are similar; blackish neck, head, breast and throat; light brown to dark brown wings and back of body; red bill and black tip; yellow legs; red wattle; iris and eye ring. In flight, shows white wing-bar and black band across tail. Juvenile are duller in color,

with whitish throat. Noisy bird; when alarmed, calls loudly and agitated ‘*did he do it, did he do it*’. Live where there is open ground adjacent to wetland. Feeding; foraging in freshly irrigated cropland, diet includes insects, snails, other invertebrates and may also feed on some grains. Feeding by walk or run in short sprut, then stops and probes, also make use of legs to disturb insect prey form soft soil. Breeding: mostly breed in on bank of larger canals and in months of march- September, varying locally (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

YELLOW-WATTLED LAPWING

Yellow-wattled Lapwing *Vanellus malabaricus* is medium sized (26-28 cm) wader. Sexes are alike; body pale brown, white supercilium, dark cap, yellow wattles and legs, brown breast band separated from the white belly by a narrow blackish line. Wings and tail pattern like red-wattled lapwing. Bill is yellow at the base. Juveniles have brown crown. Found in dry stony grassland or scrub habitat, avoiding marshy area. Breeding: display territorial behavior in early March to May. Feed mostly on beetle, termites and other invertebrates picking from ground (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

TEMMINCK’S STINT

Temminck’s stint *Cakudris temminckii* is very small sized wader 13- 15 cm length. Same like little stint but have little legs and longer wings. Head and back brown; under part of body white apart brown breast; legs yellowish; whitish outer tail feather. In all plumages, lacks mantle V and is usually uniform, with complete breast band and indistinct supercilium. Foraging: in soft mud with little vegetation, getting food by sight; for feeding creeping along the edges of pools; food including insect and other small invertebrate. Not gregarious like other wader and form large flocks. Abundant and winter visitor, preferring inland freshwater marshes, pools and fresh irrigated field (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

COMMON SNIPE

Common snipe (*Gallinago gallinago*) is a medium size wading bird have body length 25-27 cm. Male and female are similar; bill long, pointed, stout, slender about 2.5 inch long; head dark brown with pale strips, heavily streaked with buff. Further, wings shows clear white trailing edges and white under wing coverts. Belly has extensive white patches and indistinct upperwing-covert. Generally found singly, irregularly in flocks. Inhabit marshes, wet paddy stubbles and muddy edges of lakes and pond. Forage; probe in the mud for snail invertebrate like snails, small crustaceans, insects and earthworm etc (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

MARSH SANDPIPER

Marsh Sandpiper *Tringa stagnatilis* body length is about 22-25 cm; legs are slender and greenish; bill narrow, straight and black; dark brown iris. The pale lores, forehead and chin create a pale-faced appearance. Adult non-breeding: plumage on upper part of the body grey and on under part whitish. Adult breeding: Plumages on

fore-neck and breast are streaked and upper body parts are blotched and barred. Juvenile: has a dark streaked upper part with buff fringes. Forages actively, prefer fresh water wetland including lakes, river, brackish lagoons. Food includes snails, crustaceans, insects, larvae etc. Picks food gracefully from the surface, making frequent rapid darts to seize prey; probes occasionally (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREEN SANDPIPER

Green sandpiper (*Tringa ochropus*) has body length 21-24 cm, wingspan 38-43 cm and weight 74-84g has stocky body; white rump; short and grey legs; black beak; upper part dark greenish-brown; tail white with broad black lateral stripes and has indistinct supercilium behind eye. Adult breeding: has white band on crown and neck, heavily striped breast, and whitish spotting on upperparts. Usually single when feeding; may group in small flocks when on passage. Forage in shallow water, mud and in marginal vegetation; prefer invertebrate, shoots and bud. During feeding; picking prey from the water or mud. Mostly inhabit small waters often not used by other waders, such as edges of small streams, narrow ditches, marshes, wet rice fields, banks of *Jheels*, rivers and lakes (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

COMMON SANDPIPER

Common sandpiper *Actitis hypoleucos* is smallest sandpiper has body length 19-21 cm, wingspan 31-34 cm and weight 41-56 cm. upper body part grayish brown; under part white; brown marked breast; long tail; short grey legs; beak dark brown. In flight, show single white strips in wings and rapid shallow wing beats are interspersed with short glides. Have horizontal position and constant bobbing action. Preferring major canal, coast, village tank and pools, lakes, river banks and muddy sheltered creeks. Nest: build with dry leaves, grass and spruce needles; shallow depression in vegetation. prefer invertebrate, shoots and bud. During feeding; picking prey from the water or mud. Breed: in river from chitral east to Baltistan. Migrate singly or in small flock. Flight call is an sharp wee-wee-wee (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREAT BLACK-BACKED GULL

Great Black-Backed Gull *Larus mari* is the largest gull have body length 61-74 cm and weight 1.2-1.8 kg. Adult: have black mantle, wings and back; head, neck and abdomen white; slight strip on upper neck; white tail with faint dark band; grayish pink legs. Juvenile: body mottled pale brown; brown wings with white marking; white head; bill yellowish white with pale tip; legs purplish brown. Prefer large lake and other open water bodies. Diet: Omnivorous, found fishing harbors, on rubbish dump and around fishing boat; food include fish and ducklings. Mostly silent. single, although sometimes found in flocks (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREAT BLACK-HEADED GULL

Great Black-headed Gull *Larus ichthyaetus* is enormous in size, with body length about 69 cm. have angular, with sloping forehead; behind eye have crown peaks; longer bill have dark tipped, with gony; dark eyes. Adult breeding: wing brown with black subterminal band and with white margins; black cover with white eye crescents. Adult non-breeding: largely white head streaked with brownish black mask; yellow bill with red tip and black sub terminal band; outer wing whitish. First winter: grey mantle and scapular; absence of dark greater covert bar, more pronounced dark tail band. Second winter: largely grey upper wing, dark lesser covert bar, extensive black on primaries and primary coverts. Diet: Carnivorous; eating insects, fish crabs etc. Generally found on sea coast and irregularly on larger water bodies like inland lakes, large rivers and river-barrage head ponds. Founds mainly around fishing boats at river, but rarely enters harbours; Frequent winter visitor and passage migrant (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

LESSER BLACK-HEADED GULL

Lesser Black-headed Gull *Larus fuscus* is medium sized gull with body length 48-56 cm, weight 641-931 g. sexes are similar; mature and immature birds differ in some features., also they differ in summer and spring plumage. Mature, winter: black back and upper wings; black tips to under wings. white long triangle on the wing tip; white head with dark ear spot; bill red with dark tips and white yellow legs. Spring adults: head black brown; white mantle and tail. Immature: like adults, but tail have a narrow terminal black band; legs are flesh-colored. Calls recorded from flocks. Carnivorous (fish, crabs, carcasses, insects etc) but fish make up the most important food of their diet. Founds in, harbours, coasts, estuaries, large rivers, fishing villages, and inland lakes. Common winter visitor and passage migrants to coasts and inland waters (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

CASPIAN GULL

Caspian Gull *Larus cachinnans* is a large gull about 55-65 cm long and body weight 0.68 – 1.59 kg. Sexes are alike; Head pale and dark streaking on neck back; under part pale; wings covert have whitish tips; have slender long bill; legs yellow; neck longer than herring gull; dark eyes; legs pale pink to pale yellowish; dark grey back and wings; primary feather has white tips. They are scavengers and predators with varying diet. Carnivorous (fish, crabs, carcasses, insects etc) but fish make up the most essential food of their diet. Founds in, harbours, coasts, estuaries, large rivers, fishing villages, and inland lakes. Common winter visitor and passage migrants to coasts and inland waters (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

COMMON TERN

Common tern (*Sterna hirundo*) has body length 31-35 cm. Adult breeding: body pale grey; Common lores and rest of head has fully black cap; grey belly; orange red bill with black tip; tail long streamer. Adult Non breeding: Fore head whitish; partial black cap; black leg and bills. Inhibited mainly tidal creeks, estuaries, also other wetland like rivers, jheels and lakes. Foraging by flying over water, hovering and

attacking steeply to catch prey below. Also steals food from other group. Commonly feed on fish, but also eat other crustaceans, insects, leeches and marine worms. Breed in months of June and July (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

BLACK WINGED STILT

Black winged stilt *Himantopus himantopus* body length is about 35-40 cm. Adult: long pinkish legs, fine long bill, black upper part, white under part. Male often have much black head particularly in summer season and white in winter while female have less black head year round. Juvenile has sandy hue on wings, light feather fringes. Locally migratory; migration depend on feeding conditions. Diet: feed mainly on insects and crustaceans; picking food from sand or water. Nesting: bare ground near water, nest in colonies or some time with avocets (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

PIED AVOCET

Pied avocet *Recurvirostra avosetta* is a prominent wader about 42-45 cm long. Sexes are alike; black bill with upward kink; white body with black marking; head back bar; wings have black patches; long and bluish legs. Juvenile has brown and buff mottling on mantle and scapulars. Prefer marshes area and banks of rivers and lakes. Forage: feed in shallow water or mud flate, scything bill from side to side in water; food contain crustaceans and insects. Nest on open ground, often in group or in colonies with other waders. Uncommon but irregular visitor throughout Indus basin (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

WHITE-THROATED KINGFISHER

White-throated Kingfisher *Halcyon smyrnensis* is a large kingfisher with body size about 27-28 cm. Sexes are alike. Adult: White throat and breast centre; bill large and red; bright blue black, wings and tail; chestnut head, flanks and lower belly. In flight, white prominent pitches are visible on the black and blue wings. Juvenile: duller in color, with Juvenile is duller, with brown bill and black marking on breast. Call is a loud rattling laugh 'Kililili'. Inhibited gardens and wetlands like river, pools, canals, ditches, village tanks, coasts and near fish ponds. Typically perches on electric and telegraph wire, fence posts, or branches. Food contain insects, earthworm, frog, rodents, crustaceans but mostly prefer fish. Breeds in june-August varying locally. Common, cosmopolitan and sedentary in Indus plain and lower valley (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

EURASIAN COMMON KINGFISHER

Eurasian Common Kingfisher *Alcedo atthis* is small sized kingfisher about 16 cm long. It has bright metallic blue upper body par like head, back and tail; under parts and ear covert chestnut; below side of plumage orange; white neck and side of chest. Bill is blackish and reddish orange at the base; bright red legs with dark blue stripe. Inhibit near rivers, streams, lakes, ponds and canals for foraging food. Perches near wetlands on wire, fence post or branches for hunting fish. Its sites is uprights, tail downward, suddenly drops with a splash and return with a prey. Prefer fish and small

aquatic animals. Breed in June-November, varying locally. Common, widespread, resident but some local migrant (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

PIED KINGFISHER

Pied Kingfisher *Ceryle rudis* is medium size kingfisher about 30-31cm long. Body black and white; black crest, white supercilium, white patches on wings, breast have black band, undertail white with subterminal black band. Male: white breast have two dark bands, a broad band and a narrow band. Female: white breast with one cross band. Inhabit a wide range of water bodies, slow flowing water stream and rivers, still water ponds, canals, irrigation tanks, flooded ditches, *jheels* and lakes. Breeds in almost throughout the year but mainly February to April, varying locally. Nest is a hole in a excavated vertical mud bank. Abundant and widespread distributed specie in country (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

COLLARD SAND MARTIN

The body length of collard sand martin (*Riparia paludicola*) is about 12 cm. upper body part Smoky grey brown; under part white with pale grey brownish throat and breast. Song is a weak, high-pitched twitter song “titititititeteter”. Generally feeds over water, sometimes also over land, often in flocks; especially active at dusk and cloudy weather. Forms large communal roosts in reedbeds. Found around rivers and lakes; in summer around those with steep sandy banks. Breeds almost throughout the year, varying locally. Locally abundant resident, confined to Indus basin and avoiding mountainous regions (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

ROCK MARTIN

The size of rock martin (*Ptyonoprogne fuligula*) is about 13 cm. upper body part sandy grey; lower part rusty cream; whitish chin and throat. Very much similar to Eurasian Crag Martin, but is smaller and paler. particularly, has black lores and patch around eye, unmarked buffish-white throat, vent paler sandy-grey and undertail coverts, and paler underwing-coverts. Upperparts are sandy-grey, and rump can appear mainly pale. Juvenile has pale fringes to upperparts, particularly tertials and uppertail-coverts. Call is a clear like seep seep (Jonsson, 1992). A quiet bird. Sometimes in flocks with Red-rumped Swallow or House Swift. Food habit insectivorous. prefer rocky gorges and cliffs in arid hills. Breeds in April-June. Not colonial. Scarce and sedentary resident, chiefly from west of Indus to extreme western makran coast, vagrant in Baluchistan (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

BARN SWALLOW

The size of barn swallow (*Hirundo rustica*) is about 17-19 cm long including 2-7 cm outer tail feather and 16-22 g in weight. Adult: have bright blue upper part; bright red forehead, chin and throat; long tail-streamers. Underparts vary from white to rufous by a dark blue breast band. Sexes are similar, but female have short tail; less glossy

blue of the upper part and of the breast. Juvenile: brownish in color; pale rufous face; whitish under part and short tail. They prefer habitat with low vegetation like lakes, rivers, usually near water. Mode of nutrition is insectivorous like other swallow species and pick prey items from the water surface and plants. In non-breeding season it is highly gregarious. Often nest in reed beds, mangroves, and in occupied buildings. Breed in the month of March and July. Abundant resident; partial migrant; wintering throughout Indus basin and in summer, breeding in foothill in lower elevation (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

RED-RUMPED SWALLOW

Red-rumped swallow (*Hirundo daurica*) has size about 16-17 cm. Similar in habit and in appearance to barn swallow. Pale and reddish rump; face and throat collar; under part fulvous with dark striation; lack a breast band; blue vent and undertail coverts; wings broad but pointed. Group in large numbers in winter and on migration, when commonly seen in close-packed flocks on telegraph wires and in communal roosts in reed beds. Predominant in grassland for insect as a food. Normally nest under cliff overhangs in the old building. Common and wide spread summer visitor to mountain regions; also a passage migrant (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

PIED WAGTAIL

Pied Wagtail *Motacilla alba dukhunensis* is about 18-19 cm long, and 20-27 g in weight. It is black and white but extremely variable. Breeding male: white belly, cheeks, fore head. black crown, nape, throat, breast, back and flanks. Tail and wings are black but have white outer feather of tail, white wing bars and white edges. Non-breeding male: less black on the breast and grey flank. Female: body dark grey; crown, throat, breast, rump and tail are black. Juvenile: brownish grey and often yellow bar. Readily perches on telegraph wires, roofs of buildings and near water. Mode of nutrition is insectivorous typically flies and caterpillars. Spend summers by streams and rivers in open country in hills and mountains; winters in open country near water, e.g. marshes, rivers, streams, canals, lakes and wet fields, also lawns, and fallow cultivation. It's a common winter visitor near coast. Frequent in summer in main Himalayan valleys, common on passage through out KP Pakistan (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

CITRINE WAGTAIL

Citrine wagtail (*Motacilla citreola*) is about 16- 19 cm long and weigh 18-25 g. Breeding male: bright yellow head and underpart; back and scapulars are olive green; black or grey mantle; rump darker grey; upper tail covert black; tips of covert whitish form wings bars; tail black with white outer pair of rectrices. Bill is black and legs are blackish brown. Non breeding male: duller; grey crown, mantle and scapulars; yellow areas are paler. Female breeding and non breeding: broad yellow supercilium; upper part grey; under part yellow. Juvenile: lack yellow; upper part brownish; buffish supercilium; white wing bars and whitish secondary edges. Foraging over open water on emergent vegetation. Insectivorous; near water such as wet meadows and bogs etc.

Partial resident and winter migrant, winter throughout Indus plain near rivers or lakes (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

GREY WAGTAIL

Grey wagtail *Motacilla cinerea* is longest wagtail about 18-20 cm long and weigh about 17-23g. Longer tail than other wagtail; show white supercilium; upper part grey; yellow vent and under tail covert; legs pinkish brown and bill is grayish black. Adult: prominent supercilium, moustache and outer tail feathers. In winter yellow breast of male become paler. Juvenile: bill and throat pink-buff colored. Feeding habit is insectivorous, eat insect like midges and ants along river side. Nesting near shallow, fast flowing streams, waterfalls, lakes and canals etc. build nest in hollow or crevices out of twigs and grasses. Local common breeding bird, Not migrant in the normal sense but migrant to low altitude area in winter (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

UPLAND PIPIT

Upland pipit *Anthus sylvanus* was large pipit have size 7-8 inch but is uncommon and lightly distributed throughout study area. Breeds in foothills and mountains, but descends during the winter. Large-billed and rather thickset, with an upright stance, fine dark streaks throughout with paler underparts. Also note paler brow. May be confused with Richard's and Blyth's Pipits, but it is more densely streaked and with a stouter and shorter bill. Sexes are alike (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

BLACK STORK

The body length of black stork (*Ciconia nigra*) is about 90-100 cm with wing span about 185-205 cm. Adult: sexes are alike; glossy black, white lower chest down to underside of tail, red bill and legs. In flight, white under part and axillaries contrast strongly with black neck and under wings. Juvenile: head brown, brown neck and upper body part flecked with white; bill and legs grayish green. It found in pair or in small flock from river, ditches, marshy area or other wetlands. Feed mainly on fish and amphibians, captured from water surface in river; occasionally from lakes, fish ponds, shallow seawater and meadows. Scare; sporadic winter visitor and passage migrant to plain wetland. It comes over Hunza river, flies over Indus (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

WHITE STORK

White stork *Ciconia ciconia* is wading birds, stand up about 4 feet and have body length 100-125 cm. Sexes are alike; but male is larger than female. Adult: back is covered by white feather, with black flight feather at the tip of wings; long pointed red bill and long red legs. Juvenile: Similar to adult but brown greater coverts and duller brownish red bills and legs. Their food contains, insects, fish, amphibians, small mammals and birds. Primarily feed on ground, grasses and shallow water. White stork known for its unique mating dance. Rare winter migrant; recorded on passage throughout major river systems of the country (Roberts, 1991; Grimmett, 1998; Mirza and Wasiq, 2007; Grimmett *et al.*, 2008).

ASIAN WHITE-RUMPED SWIFT

Asian white-rumped swift *Apus pacificus* is body length is 15-18 cm, weigh about 44.5 g. Adult: Sexes are alike; has slimmer body, long wings and brown head; white rump; deep forked tail; under part black with indistinct white scaling; tail and upper wings are black, under wings are brown; Small bill, short black legs. Juvenile: feather show pale fringes on wings. Prefer wide range of climatic zones and habitats. Insectivorous; feed on insect caught in flight. Nest is a small cup of dry grass cemented with saliva and attach to vertical surface in caves or natural rock crevices. Flight calls are a loud, rapid 'chik-chikchik'. Rear summer breeding visitor (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

COMMON SWIFT

The body length of common swift *Apus apus* is 16-17 cm with a wingspan of 38-40 cm. sexes are alike; uniform dark brown; white throat; lack white rump like Asian white-rumped swift; pale grey patch on chin; short forked tail and very long swept back wings. Nest in variety of sites like tree holes, cliffs and natural rock crevices. Nest is a small cup of dry grass cemented with saliva and attach to vertical surface. Inhabited insect rich areas; like water lakes, marshy rivers, pools and ditches. Insectivorous; feed on insect caught in flight. Wide spread and common summer breeding visitor (Roberts, 1991; Grimmett, 1998; Mirza and Wasiaq, 2007; Grimmett *et al.*, 2008).

REFERENCES

- Ali, A., M.S.H. Khan, M. Altaf. 2018. Winter survey of birds at district of the Badin, Pakistan. *Journal of Wildlife and Ecology*. 2: 11-22.
- Ali, A., M.S.H. Khan, M. Altaf. 2020. Analysis of anthropogenic activities on avian diversity along the coastal landscape of Sindh, Pakistan *Journal of Wildlife and Ecology*. 4: 94-110.
- Ali, Z. 2005. Ecology, distribution and conservation of migratory birds at Uchalli Wetlands Complex, Punjab, Pakistan. . University of the Punjab. Pakistan.
- Altaf, M., A. Javid, Irfan, Muhammad Asif MUNIR, S. Ashraf, K.J. Iqbal, M. Umair. 2013. Diversity, distribution and ecology of birds in summer season flathead Khanki, Punjab, Pakistan. *BIOLOGIA (PAKISTAN)*. 59: 131-137.
- Altaf, M., A. Javid, M. Munir, S. Ashraf, M. Umair, K. Iqbal, A. Khan, Z. Ali. 2014. Diversity of wild mammalian fauna of Chenab riverine forest, Punjab, Pakistan. *JAPS, Journal of Animal and Plant Sciences*. 24: 1342-1347.
- Ashraf, S., S. Kanwal, M.S. Haider, M. Altaf. 2018. Diversity of birds in rural and urban habitats of district Sargodha, Pakistan. *Journal of Wildlife and Ecology*. 2: 26-36.
- Ashraf, S., A. Riaz, N. Muhammad. 2019. Assessments of avian diversity of Uchhali lake, Pakistan. *Journal of Wildlife and Ecology*. 3: 8-15.
- Cody, M.L. 1981. Habitat selection in birds: the roles of vegetation structure, competitors, and productivity. *BioScience*. 31: 107-113.
- Gorham, E., J.A. Janssens. 1992. The paleorecord of geochemistry and hydrology in northern peatlands and its relation to global change. *Suo*. 43: 117-126.

- Grimmett, R., Inskipp, C. & Inskip, T. 1998. Birds of the Indian subcontinent. Christopher Helm an imprint of A and C Black (Publisher) Ltd, 35 Bedford Row, London WC1R 4JH.
- Grimmett, R., T.J. Roberts, T. Inskipp, C. Byers. 2008. Birds of Pakistan. A&C Black.
- Hakeem, F., M. Altaf, S. Manzoor, K. Rauf, B. Mumtaz, M. Bashir, R. Haider, S.I. Farooq, L. Safdar, M. Altaf. 2017. Assessment of behavioral study, human activities impacts and interaction with Streak laughingthrush (*Trochalopteron lineatum*) in district Bagh, Azad Jammu and Kashmir-Pakistan. Journal of Wildlife and Ecology. 1: 1-7.
- IUCN. 1989. Pakistan Fact Sheet Water. Journalist Resource Centre for the Environment. IUCN Pakistan.
- Jadoon, A., S. Bibi, A. Rehman. 2019. Birds' population in district Haripur, Khyber Pakhtunkhwa, Pakistan. Journal of Wildlife and Ecology. 3: 18-25.
- McKee, J.K., P.W. Sciulli, C.D. Foote, T.A. Waite. 2004. Forecasting global biodiversity threats associated with human population growth. Biological Conservation. 115: 161-164.
- Mirza, Z.B., H. Wasiq. 2007. A field guide to birds of Pakistan Bookland, Lahore.
- Mughal, S., M. Pervaz, S.M. Bashir, S.S. Shamashad. 2020. Assessment of diversity and ethnopharmacological uses of birds in Chakar, Hattian Bala district, Azad Jammu and Kashmir -Pakistan. Journal of Wildlife and Ecology. 4: 35-44.
- Pidgeon, A., N. Mathews, R. Benoit, E. Nordheim. 2001. Response of avian communities in the northern Chihuahuan Desert to historic habitat change. Conservation Biology. 15: 1772-1788.
- Rauf, K., M. Altaf, B. Mumtaz, M. Altaf, R. Haider, B. Safeer, S.I. Farooq, L. Safdar, M. Manzoor, S. Yasrub, S.M. Bashir, A. Iftikhar. 2017. Assessment of behavior, distribution, ecology and interaction study of Cinnamon Tree Sparrow (*Passer rutilans*) in district Bagh-Pakistan. Journal of Wildlife and Ecology. 1: 43-49.
- Roberts, T.J. 1991. The Birds of Pakistan Oxford University Press. Karachi
- Umair, M. 2018. Anthropogenic impacts on the coastal wetland and wildlife-A review. Journal of Wildlife and Ecology. 2: 30-36.
- Vié, J.-C., C. Hilton-Taylor, S.N. Stuart. 2009. Wildlife in a changing world: an analysis of the 2008 IUCN Red List of threatened species. IUCN.