

Identification of Aquatic and Semi aquatic Birds of Sattarkhan Lake (East Azerbaijan- Iran)

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Abstract—Aquatic and semi aquatic birds as a group are suited to feed and breed in environments in which water forms a fundamental part. These birds are biological indicator in aquatic environment, because these birds belong to the top level of food chain in aquatic ecosystems. There are 61 species in 14 families of aquatic and semi aquatic birds in Iran. The birds of the Sattarkhan Lake belong to 16 species in 8 families which include 26.2 percent of total Aquatic and semi aquatic bird species and 57% of Aquatic and semi aquatic bird's family of Iran. Study was carried out monthly at Sattarkhan Lake show the existence of *Phalacrocorax carbo*, *Ardea cinerea*, *Egretta alba*, *Egretta garzetta*, *Bubulcus ibis*, *Botaurus stellaris*, *Sterna hirundo*, *Chlidonias leucopterus*, *Larus minutus*, *Larus argentatus*, *Larus ridibundus*, *Alcedo atthis*, *Ciconia ciconia*, *Plegadis falcinellus*, *Circus aeruginosus*, *Corvus frugilegus*

Keywords—Aquatic bird, Sattarkhan Lake, Identification, Iran

I. INTRODUCTION

THE Sattarkhan Lake (46°, 20' E; 38°, 45' N), a man made Lake, is suited near the city of Ahar, East Azarbaijan, Iran (Fig1). Its surface area is 7.2 km² with a mean depth of around 4 m and the average annual water temperature is around 11°C (range 4–16°C).

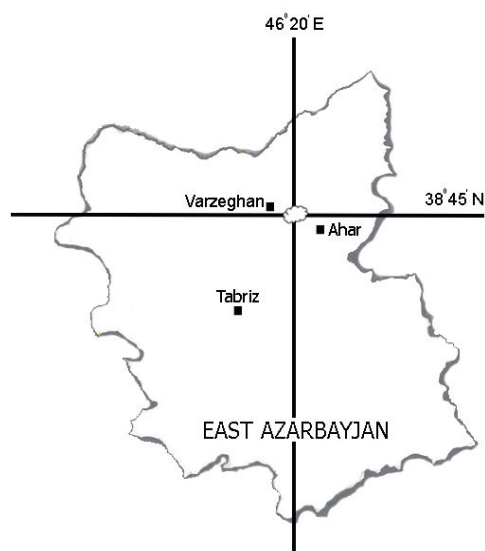


Fig. 1 Position of sampling site

This shallow lake provides excellent feeding and roosting habitat for some aquatic and semi aquatic birds. Aquatic birds have important role in Nature [1]. The structure and behavior

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of every organism has involved in relation on its environment. Each has adapted to exploit a particular niche in which it is able to compete successfully with other organisms. Aquatic and semi aquatic birds as a group are suited to feed and breed in environments in which water forms a fundamental part. Within this general scheme, however, a wide range of forms has been developed to take advantage of particular environmental niches, so that at critical times competition between closely related groups is avoided. Aquatic and semi aquatic birds are biological indicator in aquatic environment, because these birds belong to the top level of food chain in aquatic ecosystems. Ecological changed caused changing number of breeding and wintering of aquatic and semi aquatic bird's population. Ecological values of aquatic and semi aquatic birds in aquatic ecosystems in natural environment emphasizes to identification and investigation of these birds.

II. MATERIALS AND METHODS

Study was carried out monthly (for one year) in Sattarkhan Lake and identification of aquatic and semi aquatic birds has been carried out using binocular and telescope, some species of the birds have also been shot. The birds were identified according to Evans [2], Harris *et al.* [3], Hudec [4].

III. RESULTS AND DISCUSSIONS

Sixteen species of aquatic and semi aquatic fish eating birds belonging to 8 families have been identified along Sattarkhan Lake (Table I), which include 26.2 percent of total aquatic and semi aquatic bird species and 57% of aquatic and semi aquatic bird's family of Iran (there are 61 species in 14 families of aquatic and semi aquatic birds in Iran).

Phalacrocorax carbo: The Great Cormorant is a large black bird, but there is a wide variation in size in the species wide range. Weight is reported from 1.5 kg to 5.3 kg, with a typical range from 2.6 to 3.7 kg. Length can vary from 70 to 102 cm and wingspan from 121 to 160 cm. It has a longish tail and yellow throat-patch. Adults have white thigh patches in the breeding season. This is a very common and widespread bird species. It feeds on the sea, in estuaries and on freshwater lakes and rivers. These birds migrate and winter along any coast that is well-supplied with fish [5].

Ardea cinerea: It is a large bird, standing 90-100 cm tall, with a 175-195 cm wingspan and a weight of 1-2 kg. Its plumage is largely grey above, and off-white below. Adults have a white head with a broad black super cilium and slender crest, while immature have a dull grey head. It has a powerful, pinkish-yellow bill, which is brighter in breeding adults. It has a slow flight, with its long neck retracted (S-shaped). It feeds

in shallow water, catching fish, frogs and insects with its long bill. Herons will also take small mammals, reptiles and occasionally warbler nestlings, plovers, young and adult snipes, takes ducklings and tern chicks and other small birds. It will often wait motionless for prey, or slowly stalk its victim [6].

Egretta alba: The Great Egret is a large bird with all-white plumage that can reach one meter in height and weigh up to 950 grams. Apart from size, the Great Egret can be distinguished from other white egrets by its yellow bill and black legs and feet, though the bill may become darker and the lower legs lighter in the breeding season. In breeding plumage, delicate ornamental feathers are borne on the back. Males and females are identical in appearance; juveniles look like non-breeding adults. It is a common species, usually easily seen. It has a slow flight, with its neck retracted. The Great Egret feeds in shallow water or drier habitats, feeding mainly on fish, frogs, small mammals and occasionally small birds and reptiles spearing them with its long, sharp bill most of the time by standing still and allowing the prey to come within its striking distance of its bill which it uses as a spear. It will often wait motionless for prey, or slowly stalk its victim [5].

Egretta garzetta: The adult Little Egret is 55–65 cm long with an 88–106 cm wingspan. It weighs 350–550 grams. Its plumage is all white. It has long black legs with yellow feet and a slim black bill. In the breeding season, the adult has two long nape plumes and gauzy plumes on the back and breast. The bare skin between the bill and eyes becomes red or blue. Juveniles are similar to non-breeding adults but have duller legs and feet. Little Egrets are mostly silent but make various croaking and bubbling calls at their breeding colonies and produce a harsh alarm call when disturbed. This egret stalks its prey in shallow water, often running with raised wings or shuffling its feet. It may also stand still and wait to ambush prey. It eats fish, insects, amphibians, crustaceans and reptiles [7].

Bubulcus ibis: The Cattle Egret is a stocky heron with an 88–96 cm wingspan; it is 46–56 centimeters in length and weighs 270–512 gr. It has a relatively short thick neck, sturdy bill, and a hunched posture. The non-breeding adult has mainly white plumage, a yellow bill and grayish-yellow legs. During the breeding season, adults of nominate western subspecies develop orange-buff plumes on the back, breast and crown, and the bill, legs and irises become bright red for a brief period prior to pairing. The sexes are similar, but the male is marginally larger and has slightly longer breeding plumes than the female; juvenile birds lack colored plumes and have a black bill. It is a stocky white bird adorned with buff plumes in the breeding season which nests in colonies, usually near bodies of water and often with other wading birds. The nest is a platform of sticks in trees or shrubs. Unlike most other herons, it feeds in relatively dry grassy habitats, often accompanying cattle or other large mammals, since it catches insect and small vertebrate prey disturbed by these animals. Some populations of the Cattle Egret are migratory and others show post-breeding dispersal [6].

Botaurus stellaris: The Eurasian Bittern or Great Bittern (*Botaurus stellaris*) is a wading bird of the heron family Ardeidae. Bitterns are thickset herons with bright, pale, buffy-brown plumage covered with dark streaks and bars. The Eurasian or Great Bittern is 69–81 cm in length, with a 100–130 cm wingspan, although their most distinctive feature is the males booming call in spring. Bitterns feed on fish, eels, amphibians and invertebrates, hunting along the reed margins in shallow water. The Eurasian Bittern are one of the species to which the *Agreement on the Conservation of African-Eurasian Migratory Water birds* (AEWA) applies [8].

Sterna hirundo: The Common Tern (*Sterna hirundo*) is a Sea bird of the tern family Sternidae. This medium-sized tern is 34–37 cm long with a 70–80 cm wingspan. Its thin, sharp bill is red with a dark tip. Its longish legs are also red. Its upper wings show a dark primary wedge, unlike the Arctic Tern, in which they are uniformly grey. Its long tail extends only to the wingtips on the standing bird which extend past the wingtips. In winter, the forehead and under parts are white. Juvenile Common Terns show extensive ginger coloration and lack the 'scaly'. Common terns are known to reach an age of 23 years or more on occasion. The Common Tern is one of the species to which the *Agreement on the Conservation of African-Eurasian Migratory Water birds* (AEWA) applies. The Common Tern feeds by plunge-diving for fish, from either the sea or freshwater lakes and large rivers, it usually dives directly [6].

Chlidonias leucopterus: The White-winged Tern, or White-winged Black Tern, *Chlidonias leucopterus*, is a small tern generally found in or near bodies of fresh water. Adult birds in summer have short red legs and a short black bill (small and stubby, measuring 22–25 mm from the feathers, decidedly shorter than the head), a black neck (often with a pale gray back) and belly, very dark grey back, with a white rump and light grey (almost white) tail, which often looks 'square' in juveniles. The face is tinged yellowish. The wings, as the name implies, are mainly white. The inner wing is grayish with brown-tipped coverts. In non-breeding plumage, most of the black is replaced by white or pale grey, though a few blackish feathers may be retained, admixed with white under parts. The head is black, with a white forehead. The crown is blackish-brown, flecked with white, and the hind crown is blackish with a certain amount of white flecking. These white markings are pronounced in the winter adult. There is a dark triangular patch forward of the eye. The collar is fairly broad and white. In juveniles and molting adults, the rump is pale gray, becoming grey in both phases late in the year. The clear white collar and rump isolate the mantle as a dark brown 'saddle'. The mantle feathers have narrow paler brown tips, as have the tertials and scapulars. These birds do not dive for fish, but fly slowly over the water to surface-pick items on the surface and catch insects in flight. They mainly eat insects and small fish. In flight, the build appears thick-set. The wingbeats are shallow and leisurely. The White-winged Tern is one of the species to which the *Agreement on the Conservation of African-Eurasian Migratory Water birds* (AEWA) applies [8].

Larus minutus: The Little Gull is a small gull which breeds

in northern Europe and Asia. It is migratory, wintering on coasts. This species breeds colonially on freshwater marshes, making a lined nest on the ground amongst vegetation. Normally, 2-6 eggs are laid. This is the smallest gull species, with a length of 25-27 cm, a wingspan of 75-80 cm and a weight of 68-133 grams. It is pale grey in breeding plumage with a black hood, dark under wings and often a pinkish flush on the breast. In winter, the head goes white apart from a darker cap and eye-spot. The bill is thin and black and the legs dark red. The flight on rounded wings is somewhat tern-like. Young birds have black markings on the head and upperparts, and "W" pattern across the wings. They take three years to reach maturity. These gulls pick food off the water surface, and will also catch insects in the air [5].

Larus argentatus: The European Herring Gull (*Larus argentatus*) is a large gull (up to 66 cm long). The male European Herring Gull is 60–66 cm long and weighs 1050-1250 grams while the female is 55–62 cm and weighs 800-980 grams. The wingspan is 137–150 cm. Adults in breeding plumage have a grey back and upper wings and white head and under parts. The wingtips are black with white spots known as "mirrors". The bill is yellow with a red spot and there is a ring of bare yellow skin around the pale eye. The legs are normally pink at all ages but can be yellowish. Non-breeding adults have brown streaks on the head and neck. Male and female plumage is identical at all stages of development, however adult males are often larger. These are omnivores and will scavenge from garbage dumps, landfill sites, and sewage outflows. It also steals the eggs and young of other birds (including those of other gulls), as well as seeking suitable small prey in fields, on the coast or in urban areas, or robbing plovers or lapwings of their catches. European Herring Gulls may also dive from the surface of the water or engage in plunge diving in the pursuit of aquatic prey, though they are typically unable to reach depths of greater than 1–2 meters due to their natural buoyancy. Despite their name, they have no special preference for herrings— in fact, examinations have shown that echinoderms and crustaceans comprised a greater portion of these gulls' stomach contents than fish, although fish is the principal element of regurgitations for nestlings. European Herring Gulls can frequently be seen to drop shelled prey from a height in order to break the shell. In addition, the European Herring Gull has been observed using pieces of bread as bait with which to catch goldfish [7].

Larus ridibundus: The Black-headed Gull is a small gull. Most of the population is migratory, wintering but some are resident. This gull is 38-44 cm long with a 94-105 cm wingspan. In flight, the white leading edge to the wing is a good field mark. The summer adult has a chocolate-brown head (not black, despite the name), pale grey body, black tips to the primary wing feathers, and red bill and legs. The hood is lost in winter, leaving just dark vertical streaks. This is a noisy species, especially at colonies, with a familiar "kree-ar" call. Its scientific name means "laughing gull". It breeds in colonies nesting on the ground. Like most gulls, it is highly gregarious in winter, both when feeding or in evening roosts. It is not a pelagic species, and is rarely seen at sea far from coasts. The

Black-headed Gull is a bold and opportunist feeder and will eat insects, fish, seeds, worms, scraps and carrion in towns, or take invertebrates in ploughed fields with equal relish [6].

Alcedo atthis: This species has the typical short-tailed, dumpy-bodied large-headed and long-billed kingfisher shape. The adult male has green-blue upperparts with pale azure-blue back and rump, a rufous patch by the bill base, and a rufous ear-patch. It has a green-blue neck stripe, white neck blaze and throat, rufous under parts, and a black bill with some red at the base. The legs and feet are bright red. It is about 16 centimeters long with a wingspan of 25 cm and weighs 34–46 grams. The female is identical in appearance to the male except that her lower mandible is orange-red with a black tip. The juvenile is similar to the adult, but with duller and greener upperparts and paler under parts. Its bill is black, and the legs are also initially black. The Common Kingfisher hunts from a perch 1–2 m above the water, on a branch, post or riverbank, bill pointing down as it searches for prey. It bobs its head when food is detected to gauge the distance, and plunges steeply down to seize its prey usually no deeper than 25 cm below the surface. The wings are opened under water and the open eyes are protected by the transparent third eyelid. The bird raises beak-first from the surface and flies back to its perch. At the perch the fish is adjusted until it is held near its tail and beaten against the perch several times. Once dead, the fish is positioned lengthways and swallowed head-first. The food is mainly fish up to 12.5 cm long, but the average size is 2.3 cm. About 60% of food items are fish, but this kingfisher also catches aquatic insects such as dragonfly larvae and water beetles and in winter, crustaceans including freshwater shrimps [5].

Ciconia ciconia: The White Stork (*Ciconia ciconia*) is a large wading bird in the family Ciconiidae. It is a strong migrant bird. It is a huge bird, 100–125 cm tall, with a 155–200 cm wingspan and a weight of 2.3–4.5 kg. It is completely white except for the black wing flight feathers, and its red bill and legs, which are black on juveniles. It walks slowly and steadily on the ground. White storks breed in open farmland areas with access to marshy wetlands, building a stick nest in trees, on buildings, or special platforms. Because it is viewed as bird of good luck, it is not persecuted, and often nests close to human habitation. It often forms small colonies. Like most of its relatives, it feeds on fish, frogs and insects but also eats small reptiles, rodents and smaller birds [7].

Plegadis falcinellus: The Glossy Ibis is a wading bird in the family Threskiornithidae. The Glossy Ibis nests colonially in trees, often with herons. It is also gregarious when feeding in marshy wetlands; it preys on fish, frogs and other water creatures, as well as occasionally on insects. This species is 55–65 cm long with an 88–105 cm wingspan. Breeding adults have reddish-brown bodies and shiny bottle-green wings. Non-breeders and juveniles have duller bodies. This species has a brownish bill, dark facial skin bordered above and below in blue-gray (non-breeding) to cobalt blue (breeding), and red-brown legs. Ibises fly with necks outstretched, their flight being graceful and often in V-formation. The Glossy Ibis is one of the species to which the *Agreement on the*

Conservation of African-Eurasian Migratory Water birds (AEWA) applies [8].

Circus aeruginosus: The Western Marsh-harrier is 42 to 56 cm in length, and has a wingspan of 115 to 140 cm. It is a large, bulky harrier with fairly broad wings, and has a strong and peculiar sexual dichromatism. The male's plumage is mostly a cryptic reddish-brown with lighter yellowish streaks, which are particularly prominent on the breast. The head and shoulders are mostly pale grayish-yellowish. The rectrices and the secondary and tertiary remiges are pure grey, the latter contrasting with the brown forewing and the black primary remiges at the wingtips. The upper side and underside of the wing look similar, though the brown is lighter on the under wing. Whether from the side or below, flying males appear characteristically three-colored brown-grey-black. The legs, feet, irides and the cere of the black bill are yellow. The female is almost entirely chocolate-brown. The top of the head, the throat and the shoulders have of a conspicuously lighter yellowish color; this can be clearly delimited and very contrasting, or (particularly in worn plumage) be more washed-out, resembling the male's head colors. But the eye area of the female is always darker, making the light eye stand out, while the male's head is altogether not very contrastingly colored and the female lacks the grey wing-patch and tail. Juveniles are similar to females, but usually have less yellow, particularly on the shoulders. It feeds particularly on small mammals such as water voles (*Arvicola*) and birds but also eats insects, amphibians and fish [7].

Corvus frugilegus: The Rook (*Corvus frugilegus*) is a member of the Corvidae family in the passerine order of birds. This species is medium in size (45–47 cm in length) with black feathers often showing a blue or bluish-purple sheen in bright sunlight. The feathers on the head, neck and shoulders are particularly dense and silky. The legs and feet are generally black and the bill grey-black. Food is predominantly earthworm and insect larvae, which the bird finds by probing the ground with its strong bill. It also eats cultivated cereal grain, smaller amounts of fruit, small mammals, acorns, small birds their eggs and young and carrion. It has also been seen along the seashore, feeding on insects, crustacean and suitable food flotsam [6].

A. Migration-based grouping

1. Migratory Breeders

Two species of fish-eating birds (*Chlidonias leucopterus* and *Sterna hirundo*) migrate to the region in spring to breed. *Phalacrocorax carbo* was the migratory breeder in this area too. Breeder population of the *Chlidonias leucopterus* is more than the other two species.

2. Residents

Thirteen species of fish-eating birds are resident of Sattarkhan Lake. *Ardea cinerea*, *Egretta garzetta*, *Egretta alba* and *Alcedo atthis* are represent this group.

B. Habitat preference based grouping

Habitat preference-based of fish-eating birds of Sattarkhan

Lake are divided into the three following groups:

1. Terrestrial species

These species live on land and are not swimmers; they only depend on water bodies for feeding. Some species like *Alcedo atthis* represent this group.

2. Wading birds

These species live along the edges of water bodies, but do not swim. Species of *Ardeidae* represent this group.

3. Aquatic birds

These swimming species feed in various water bodies (Doorbon, 1984). *Laridae* and *Phalacrocoracidae* species represent this group.

4. Common species

Population of these species is common in the region. *Ardeidea* and *Laridae* species represent this group.

C. Classification based on feeding behavior

Based on feeding behavior fish-eating bird is divided into the following four groups:

- Group moving, moving feeders, these birds move in group and feed while moving. *Phalacrocorax Carbo* represents this group.

- Individual, moving and still-feeder, these birds move individually and feed while still. *Egretta alba* and *Egretta garzetta* represent this group.

- Combined moving and feeding behavior, these species show a combined feeding and moving behavior as the earlier two categories. *Ardeidae* species represent this group.

Alcedo atthis, a resident is terrestrial birds, but feed on fish in wetlands. All Gull species *Larus sp.* are wintering birds throughout the region. Two species *Sterna hirundo* and *Chlidonias leucopterus* breed in the wetlands of the region. Diversity of *Laridae* and *Ardeida* with 5 species is more than the others families. *Botaurus stellaris* is rare species that breed in reed-beds of the region, but no longer found to breed in the area, although limited wintering is reported. Abundance and diversity of fish-eating birds in various habitat of the region depend on the security and food abundance.

TABLE I
LIST OF AQUATIC AND SEMI AQUATIC BIRDS IN SATTARKHAN LAKE

	Scientific name	Family
1	<i>Phalacrocorax carbo</i>	Phalacrocoracidae
2	<i>Ardea cinerea</i>	
3	<i>Egretta alba</i>	
4	<i>Egretta garzetta</i>	
5	<i>Bubulcus ibis</i>	
6	<i>Botaurus stellaris</i>	
7	<i>Sterna hirundo</i>	Laridae
8	<i>Chlidonias leucopterus</i>	
9	<i>Larus minutus</i>	
10	<i>Larus argentatus</i>	
11	<i>Larus ridibundus</i>	
12	<i>Alcedo atthis</i>	Alcedinidae
13	<i>Ciconia ciconia</i>	Ciconiidae
14	<i>Plegadis falcinellus</i>	Threskiornithidae
15	<i>Circus aeruginosus</i>	Accipiteridae
16	<i>Corvus frugilegus</i>	Corvidae

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