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Assessment of the Conservation Value of Wetland Birds on the Pallikaranai Marsh, Chennai, Tamil Nadu, India

Thirunavukkarasu N.^{1*} and Nesakumari Sheeba A.C.²

¹Department of Zoology, Dr. Ambedkar Government Arts College (Autonomous), Vyasarpadi, Chennai 600 039, India

²Department of Zoology, Madras Christian College (Autonomous), Tambaram, Chennai 600 059, India

**Corresponding Author*

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Abstract: The present study was carried out to assess the status and conservation issues of wetland birds in Pallikaranai marsh, Chennai, India from March 2021 to February 2022. The dominant family was Ardeidae represented by 9 species followed by Anatidae with 6 species, Threskiornithidae and Scolopacidae with 4 species. The families with representation with one species were Accipitridae, Anhingidae, Ciconiidae, Dicruridae, Sturnidae, Pelecanidae, Muscicapidae, Phoenicopteridae, Podicipedidae, Rostratulidae, Laridae, Hirundinidae, Columbidae and Cuculidae. Totally 60 species were identified during the study period. Higher numbers of birds were recorded in the month of April. Birds migration status, feeding habits and IUCN status were investigated. Majority of the birds are under the least concern category, the birds viz. Painted stork, Black tailed godwit and Oriental darter are under Near Threatened category. The present study site is also facing tremendous conservation challenges by the impacts of anthropogenic alteration of the habitats in and around the marshy area. The diversity of avifauna that occur in large numbers in this area invites attention for conservation of the Pallikaranai wetlands and prevention from further degradation.

Keywords: Wetland birds, Diversity, Pallikaranai marsh, Conservation threats, IUCN

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Introduction

The birds which inhabit and dependent on wetland directly or indirectly for feeding, nesting or roosting are commonly called water birds/ wetland birds. Selection of wetland by waterfowl is influenced by complex characteristics including water chemistry, aquatic vegetation, invertebrate fauna and physical features. Pallikaranai marsh

functions as habitat for indigenous and migratory birds. Every year huge number of water fowls and waders are sighted on the mudflats of the marsh land between June to December (during winter). Due to the availability of ideal climate for breeding and food resources, it is an important stopover for the migratory species for resting and refuelling.

Water fowls form important links in the food web and nutrient cycles. Wetlands are biologically diverse support systems that maintain the essential ecological processes and perform a number of valuable functions such as to provide habitat for indigenous and migratory birds and harbors variety of germplasm of rare and endangered species.

The wetlands are facing tremendous anthropogenic pressure, which can greatly influence the structure of the bird community. The loss of water bird habitats through direct and indirect human interferences has led to a decline in several water bird population. Monitoring of wetland birds provides valuable information on the ecological health and states of wetlands and can be vital tool for developing awareness regarding the conservation value of the wetlands. The importance of local landscapes for conservation of avifauna can only be understood by knowing the structure of the bird community of that region.

The basic requirements of the migratory birds at their wintering sites are adequate food supply and safety. The diversity of wetland birds gradually decreasing due to disturbances by the heavy vehicular movement, other factors include habitat degradation due to encroachment, siltation, anthropogenic pressure and less availability of abundant food, draining of water, sewage, domestic garbage, weed infestation and development activities. Food changes are highly susceptible to habitat disturbances and are therefore good indicators of the general conditions of wetland habitats.

Many studies have been carried out throughout nationwide about water birds status and conservation viz., Thane Creek (Adhikari, 2019; Pachpande and Pejaver, 2016), Rapti and Narayani rivers (Khanda *et al.*, 2017), Kamarandali Lake (Harish and Hosetti, 2018), Perur Lake (Parameshwaran and Sivashankar, 2018), Baur Reservoir (Ahmed *et al.*, 2019), Porbandhar (Vargia and Chakraborty, 2019), Greater Noida (Ansari and Nawab, 2015),

Pallikaranai (Raj *et al.*, 2010), Ujjaini (Karikar *et al.*, 2019) and Kole wetlands (Sivaperuman and Jayson, 2000).

The Chennai metropolis waste dumpyard and Perungudi sewage treatment plant occupy 250 acres of prime marsh lands. The population growth resulted in a rapid growth in municipal solid waste generation rate of the city. Perungudi dumpyard receives around 5000 tons of waste per day. Contaminated liquid in the form of leachates generated from liquid present in the reflux, intrusion of ground water into the land fill and different sources of moisture entering the uncovered waste by precipitation migrates from the dump site. The toxic heavy metals entering the ecosystem may lead to geo-accumulation. Heavy metals like Fe, Cu, Zn, Ni, Cr, Pb, Cd and other trace elements are important for proper functioning of biological systems and their deficiency or excess could lead to a number of disorders. The present study focused on wetland birds population, migration status, feeding habit and IUCN status from the Pallikaranai marsh, Chennai, India.

Materials and Methods

Pallikaranai wetlands falls between 12° 59'N and 80° 14'E, located about 20km south of the Chennai metropolitan area and falls in the Kancheepuram District of Tamil Nadu (Fig. 1). The wetland runs along the old Mahabalipuram road parallel to the Buckingham Canal throughout its length in the south west of Chennai. The wetland is an extensive low lying area, covered by a mosaic of aquatic grass species, scrub, marsh, and water logged depressions. It has a catchment of 235 km² that includes the urban sprawls of Velachery, Pallikaranai and Navalur. The wetland drains through Okkium Maduvu in Thoraipakkam to the Buckingham Canal, which discharges into the Kovalam Estuary. The area receives 1300mm of annual rainfall. The most rainfall occurs during the northeast monsoon (September - November) and partially from the southwest monsoon (June-August). Temperatures vary seasonally; in summer the maximum ranging from 35 to 42 °C and in winter from 25 to 34 °C.

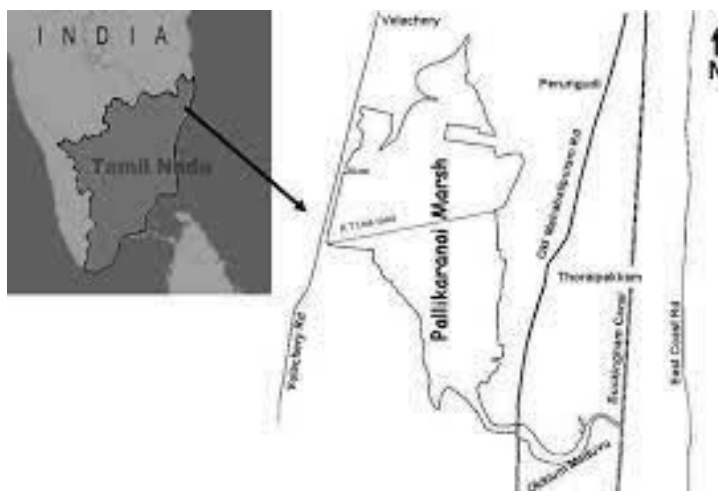


Fig. 1: Pallikaranai marsh area.

The checklist of the wetland birds was prepared and the study period from March 2021 to February 2022 (One year) across the marshy area. Total counts were carried out by direct and point counting methods of birds. A total of 52 visits (4-5 visits / month) in the field observing status and diversity of birds in twelve months period. Birds were observed from 6 am to 9 am and identified using OLYMPUS binocular (8-16X40 Zoom DPS I) with field guides for identification and photograph were captured from NIKON (DSLR D5600 Dual Kt (18-55 / 70 - 300) VR) camera. The opportunistic counts during other times of the day are also included in the checklist. Birds were identified according to the nomenclature and taxonomic sequence of Grimmett *et al.* (2000).

Results and Discussion

The wetland birds were identified from the month of March 2021 to February 2022 for one year period. Total 60 species were identified during the study period. Higher number of birds were recorded in the month of April. Birds migration status, feeding habits and IUCN status are given in Table 1. The birds recorded dominantly were Little egret, Northern pintail, Intermediate egret, Spot billed pelican, Painted stork, Black winged stilt, Great egret, Spot billed duck, Glossy ibis, Northern shoveler, Eurasian coot and Fulvous whistling duck. This may be due to suitable

climatic factors, suitable feed and adequate water availability.

The wetland birds like Spot billed duck, Fulvous whistling duck, Black winged stilt, Painted stork, Flamingos and Little egret were dominated in the month of March, April and May. Further in the mid of July rain brings more water in the marshy area which is favorable for occupying birds population. The Eurasian moorhen population were higher in the month of May and the Grey headed swamphen population were dominated in the month of June. These birds feeding ground could be plant covered area where smaller organisms associated with plants. Even lesser water sources in the months of May and June they could find the feed in the plants associated area. Thin population of birds was noticed in the month of June due to water scarcity (summer months leads to water evaporation) and no rain.

Eurasian coot, Great egret and Glossy ibis were recorded abundantly in the month of October. Northern shoveler, Intermediate egret and Northern pintail were observed more in the month of December, January and February due to the suitable climatic conditions. Recorded wetland birds, assemblage of birds and flying of birds are given in Figure 2.

Overall the individual population was higher in the order as follows: Little egrets - 2704,

Table 1: Status of wetland birds from Pallikaranai marsh from March 2021 to February 2022

S. No.	Name of the Bird	Family	Scientific Name	Migration Status	Feeding Habit	IUCN Status
1	Plain prinia	Cisticolidae	<i>Prinia inornata</i>	R	I	LC
2	Paddy field pipit	Motacillidae	<i>Anthus rufulus</i>	R	I	LC
3	Black drongo	Dicruridae	<i>Dicrurus macrocercus</i>	R	I, IN	LC
4	Common myna	Sturnidae	<i>Acridotheres tristis</i>	R	F, I, A	LC
5	Black kite	Accipitridae	<i>Milvus migrans</i>	RM	I, P, A	LC
6	Black headed ibis	Threskiornithidae	<i>Threskiornis melanocephalus</i>	R	I, G, A, RP	LC
7	Indian pond heron	Ardeidae	<i>Ardeola grayii</i>	R	I, P	LC
8	White breasted waterhen	Rallidae	<i>Amaurornis phoenicurus</i>	R	F, I, IN, P	LC
9	Gargany	Anatidae	<i>Spatula querquedula</i>	M	IN, W	LC
10	Northern shoveler	Anatidae	<i>Spatula clypeata</i>	RM	IN	LC
11	Eurasian moorhen	Rallidae	<i>Gallinula chloropus</i>	RM	H, I, N	LC
12	Eurasian coot	Rallidae	<i>Fulica atra</i>	RM	IN, W, H	LC
13	Spot billed duck	Anatidae	<i>Anas zonorhyncha</i>	RM	W, H	LC
14	Spot billed pelican	Pelecanidae	<i>Pelecanus philippensis</i>	RM	P	LC
15	Cattle egret	<u>Ardeidae</u>	<i>Bubulcus ibis</i>	R	I, P, A	LC
16	Fulvous whistling duck	Anatidae	<i>Dendrocygna bicolor</i>	M	G, IN, P, A	LC
17	Wood sand piper	Scolopacidae	<i>Tringa glareola</i>	M	I	LC
18	Black winged stilt	Recurvirostridae	<i>Himantopus himantopus</i>	R	IN	LC
19	Purple heron	Ardeidae	<i>Ardea purpurea</i>	RM	P, A, OP	LC
20	Blue tailed bee eater	Meropidae	<i>Merops philippinus</i>	R	I	LC
21	Red wattled lapwing	Charadriidae	<i>Vanellus indicus</i>	RM	I, IN	LC
22	Grey headed swampon	Rallidae	<i>Porphyrio poliocephalus</i>	M	W, G, RP, I	LC
23	Little cormorant	Phalacrocoracidae	<i>Microcarbo niger</i>	RM	P	LC
24	Grey heron	Ardeidae	<i>Ardea cinerea</i>	R	P, A	LC
25	Painted stork	Ciconiidae	<i>Mycteria leucocephala</i>	RM	P, IN	NT
26	Great egret	Ardeidae	<i>Casmerodius albus</i>	RM	P, A	LC

27	Intermediate egret	Ardeidae	<i>Ardea intermedia</i>	M	I, P, A, RP	LC
28	Little egret	Ardeidae	<i>Egretta garzetta</i>	M	I, P, A, RP	LC
29	Black tailed godwit	Scolopacidae	<i>Limosa limosa</i>	M	I, IN	NT
30	Glossy ibis	Threskiornithidae	<i>Plegadis falcinellus</i>	M	G, I, IN, P, RP	LC
31	Green bee eater	Meropidae	<i>Merops orientalis</i>	R	I	LC
32	Ashy prinia	Cisticolidae	<i>Prinina socialis</i>	R	I	LC
33	Grey wagtail	Motacillidae	<i>Motacilla cinerea</i>	RM	I	LC
34	Bronze winged jagana	Jacanidae	<i>Metopidius indicus</i>	R	I, IN	LC
35	Night heron	Ardeidae	<i>Nycticorax nycticorax</i>	RM	I, IN, P, A, RP	LC
36	Pied bushchat	Muscicapidae	<i>Saxicola caprata</i>	M	I	LC
37	White breasted wagtail	Motacillidae	<i>Dendronanthus indicus</i>	R	I	LC
38	Greater flamingo	Phoenicopteridae	<i>Phoenicopterus roseus</i>	RM	IN, PL	LC
39	Little grebe	Podicipedidae	<i>Tachybaptus ruficollis</i>	RM	I	LC
40	Lesser whistling duck	Anatidae	<i>Dendrocygna javanica</i>	RM	H, G, IN, P	LC
41	Eurasian spoonbill	Threskiornithidae	<i>Platalea leucorodia</i>	RM	A, IN, I, W	LC
42	Ruff	Scolopacidae	<i>Calidris pugnax</i>	M	G, I, IN, A, RP	LC
43	Common sandpiper	Scolopacidae	<i>Actitis hypoleucos</i>	M	I, IN	LC
44	Pheasant tailed jagana	Jacanidae	<i>Hydrophasianus chirurgus</i>	M	W, I, IN	LC
45	Greater cormorant	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	RM	P, A	LC
46	Yellow bittern	Ardeidae	<i>Ixobrychus sinensis</i>	R	IN, P, A	LC
47	Oriental Darter	Anhingidae	<i>Anhinga melanogaster</i>	R	IN, A, RP	NT
48	White Throated Kingfisher	Alcedinidae	<i>Halcyon smyrnensis</i>	R	IN, A, RP	LC
49	Asian Spoonbill	Threskiornithidae	<i>Platalea leucorodia</i>	RM	A, IN, I, W	LC
50	Painted Snipe	Rostratulidae	<i>Rostratula benghalensis</i>	M	I, IN	LC
51	Whiskered tern	Laridae	<i>Chlidonias hybrida</i>	R	I, IN, A	LC
52	Barn Swallow	Hirundinidae	<i>Hirundo rustica</i>	M	I	LC
53	Pied Kingfisher	Alcedinidae	<i>Ceryle rudis</i>	R	P, A, IN	LC

54	Osprey	Pandionidae	<i>Pandion haliaetus</i>	RM	P	LC
55	Northern Pintail	Anatidae	<i>Anas acuta</i>	M	G, W, I, IN	LC
56	Laughing dove	Columbidae	<i>Streptopelia senegalensis</i>	R	I, RP, PD	LC
57	Asian koel	Cuculidae	<i>Eudynamys scolopaceus</i>	M	F, I, RP	LC
58	Pied crested cuckoo	Cuculidae	<i>Clamator jacobinus</i>	R	I	LC
59	Brown shrike	Laniidae	<i>Lanius cristatus</i>	M	I	LC
60	Grey headed lapwing	Charadriidae	<i>Vanellus cinereus</i>	M	I, IN, P	LC

R –Resident, RM – Resident Migrant, M – Migrant, F – Frugivore, P – Piscivore, G – Granivore, I –Insect and other invertebrate feeder, IN – Aquatic invertebrate feeder, A – Amphibian feeder, RP – Reptile feeder, W –Weedivore, LC – Least Concern, NT- Near Threaten



Black tailed godwit



Eurasian moorhen



Glossy ibis



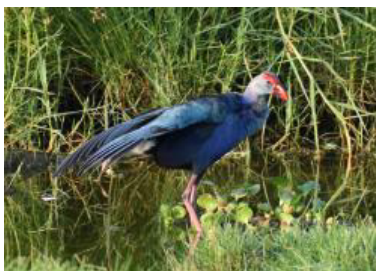
Green bee eater



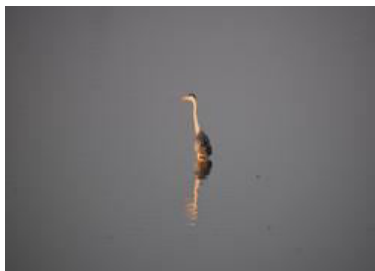
Blue tailed bee eater



Plain prinia



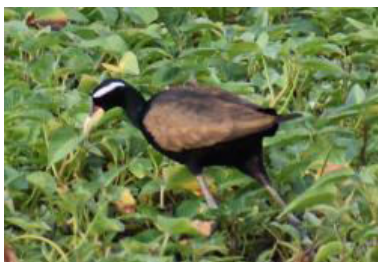
Grey headed swamphen



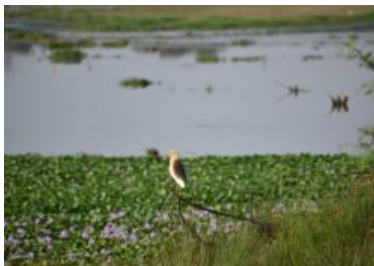
Grey heron



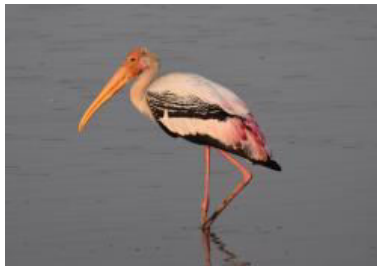
Grey wagtail



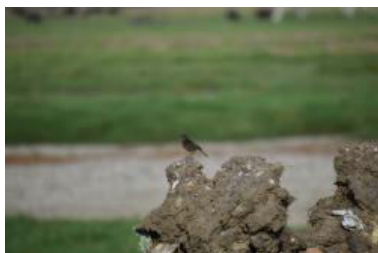
Bronze winged jagana



Night heron



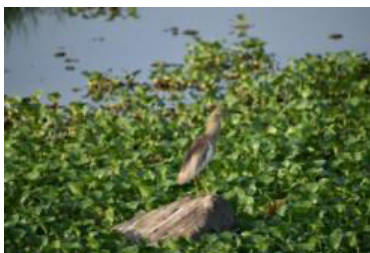
Painted stork



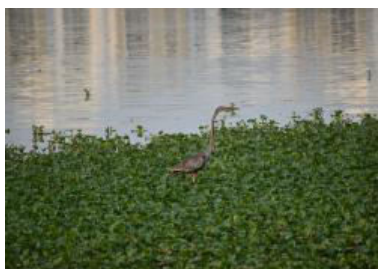
Pied bushchat



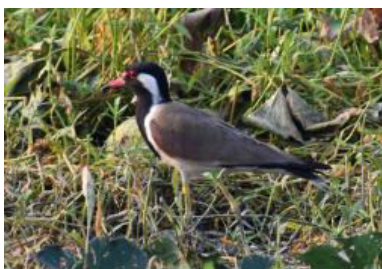
Ashy prinia



Indian pond heron



Purple heron



Red wattled lapwing



Paddy field pipit



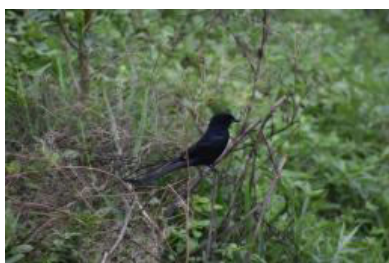
White breasted waterhen



White breasted wagtail



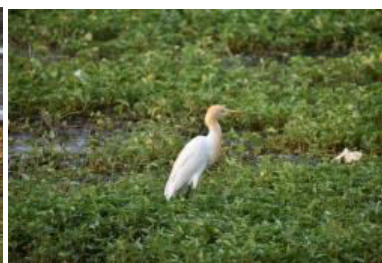
White throated kingfisher



Black drongo



Black headed ibis



Cattle egret



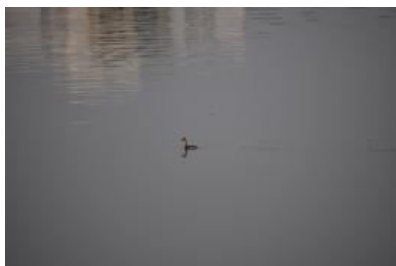
Common myna



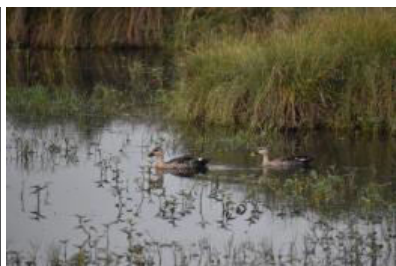
Greater flamingo



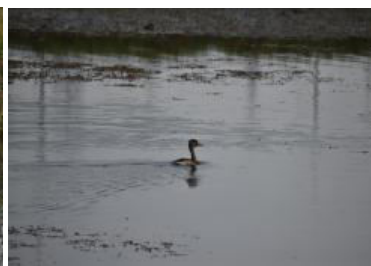
Little cormorant



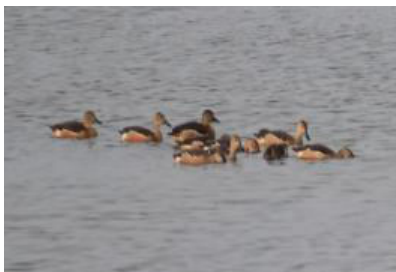
Little grebe



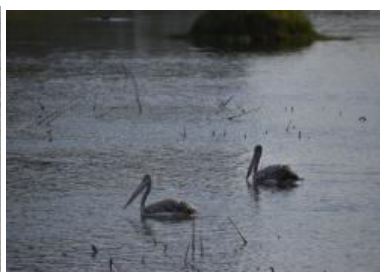
Spot billed duck



Lesser whistling duck



Fulvous whistling duck



Spot billed pelican



Little egret



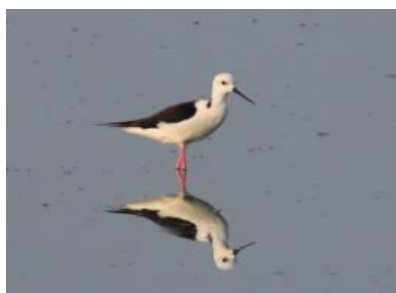
Intermediate egret



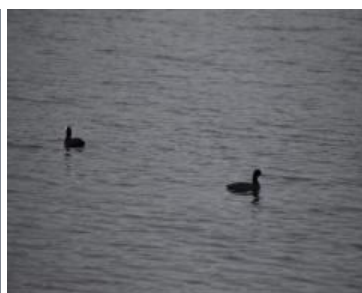
Great egret



Eurasian spoonbill



Black winged stilt



Eurasian coot



Gargany



Ruff



Common sandpiper



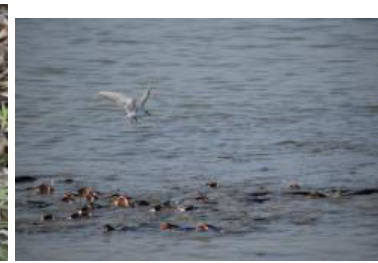
Wood sandpiper



Pheasant tailed jayana



Painted snipe



Whiskered tern



Oriental tarter



Barn swallow



Pied kingfisher



Osprey



Yellow bittern



Greater cormorant



Laughing dove



Grey headed lapwing



Pied crested cuckoo

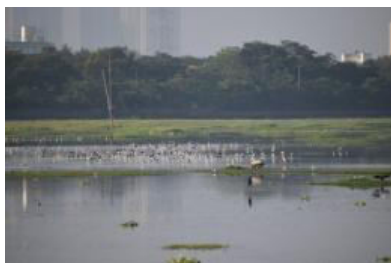


Brown shrike



Asian koel

Assemblage of birds



Flying Birds

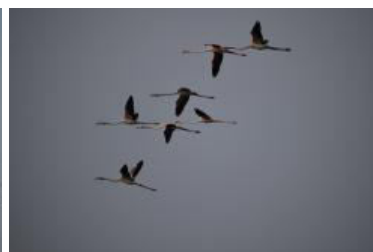


Fig. 2: Wetland birds, assemblage of birds and flying of birds in Pallikaranai marsh area.

Norhten pintail – 1988, Intermediate egret – 1711, Spot billed pelican – 1087, Painted stork – 867, Black winged stilt – 804, Great egret – 747, Spot billed duck – 716, Glossy ibis – 511, Northern shoveler – 504, Eurasian coot – 486 and Fulvous whistling duck – 418. The wetland birds details

are given in Table 1. Majority of the birds are under the least concern category, the birds viz, Painted stork, Black tailed godwit and Orientel darter are under Near Threatened category. The population of various birds are depicted in Figures 3 to 10.

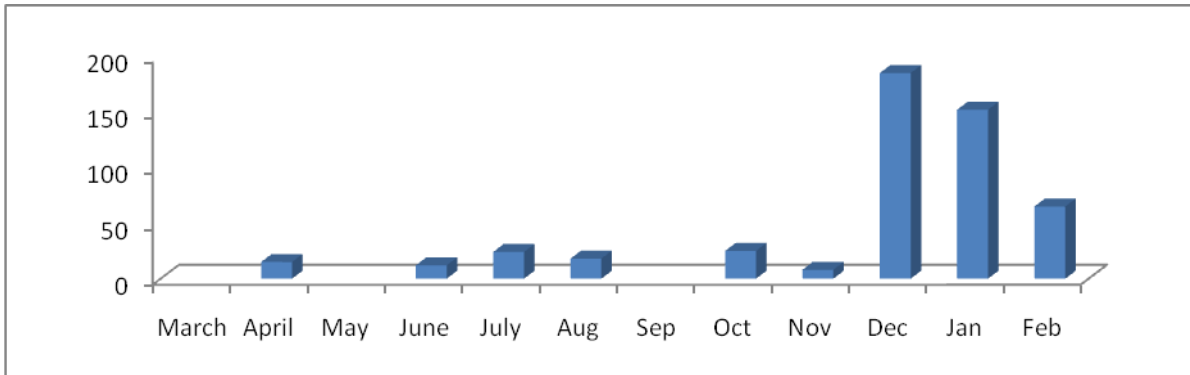


Fig. 3: Population of Northern Shoveler.

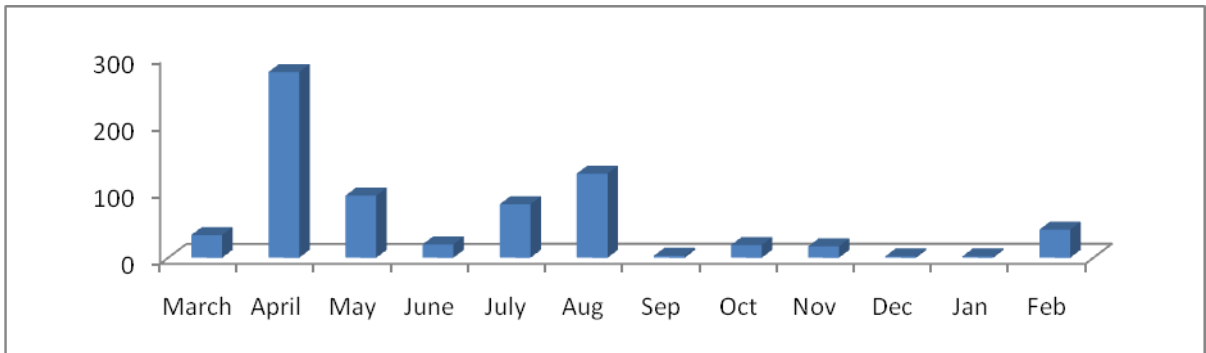


Fig. 4: Population of Spot Billed Duck.

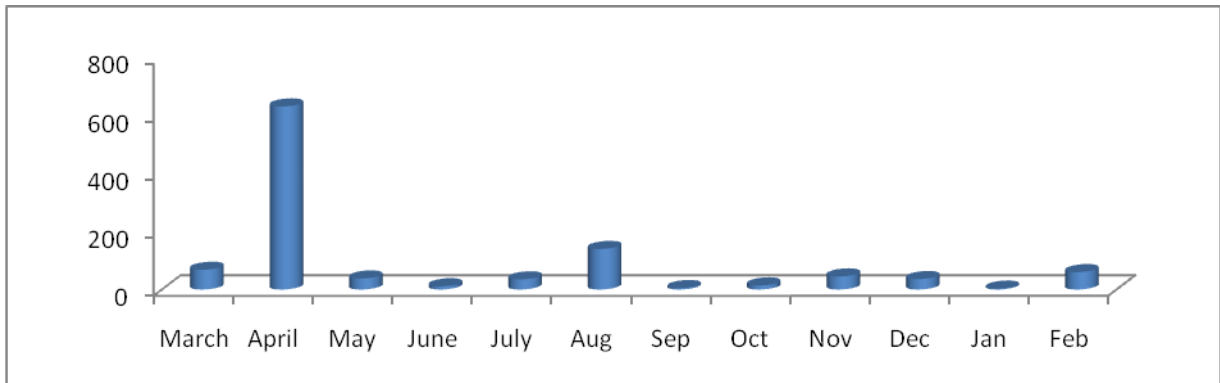


Fig. 5: Population of Spot Billed Pelican.

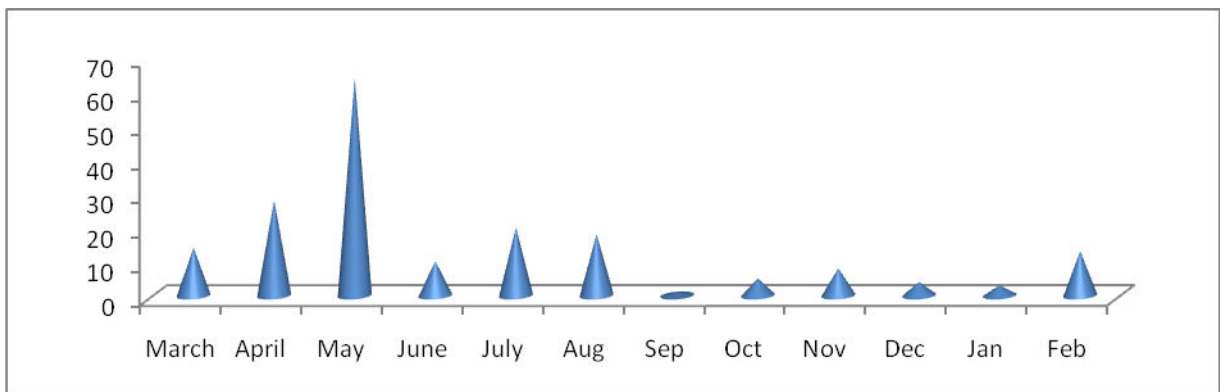


Fig. 6: Population of Grey Headed Swamphen.

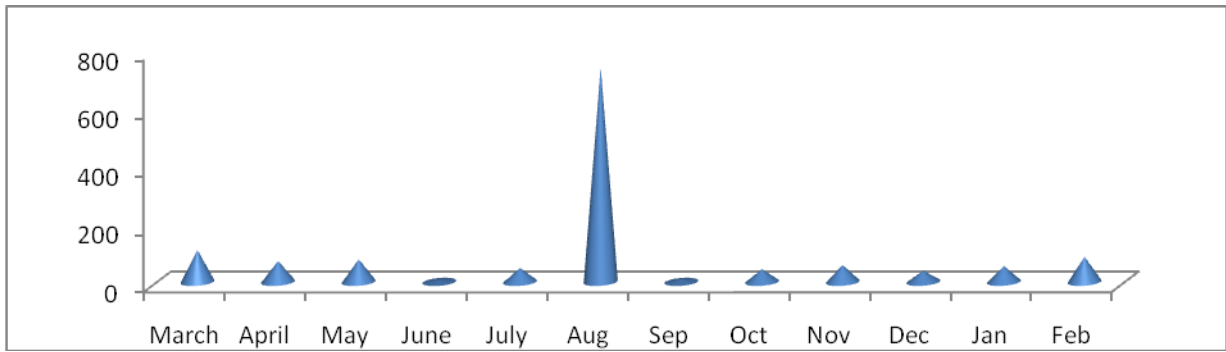


Fig. 7: Population of Little Cormorant.

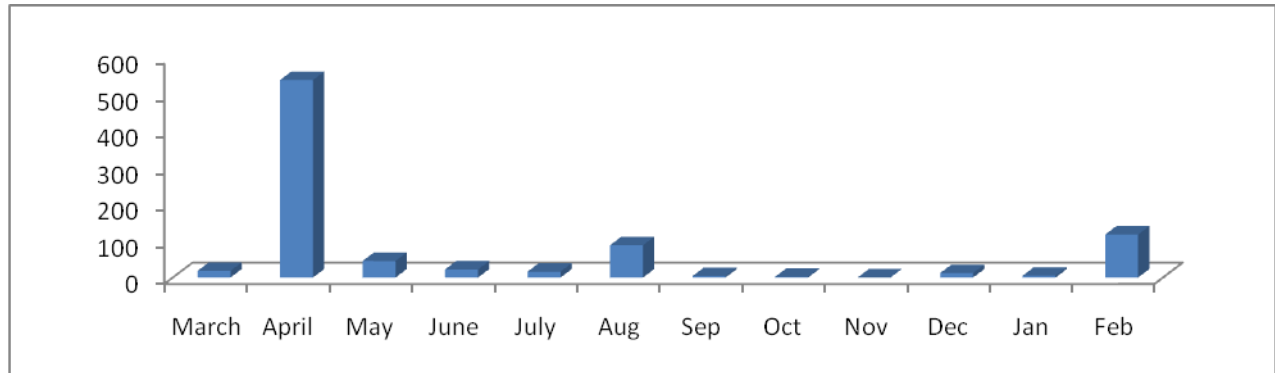


Fig. 8: Population of Painted Stork.

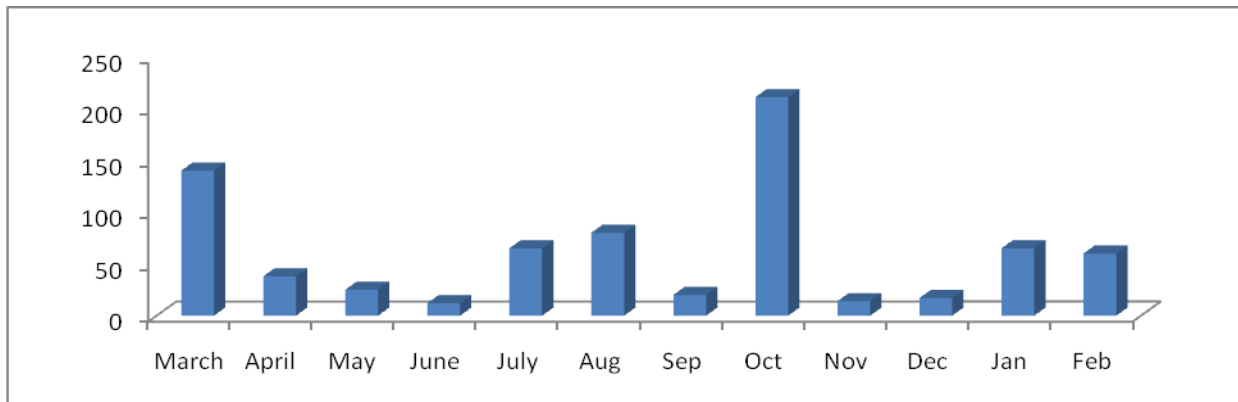


Fig. 9: Population of Great Egret.

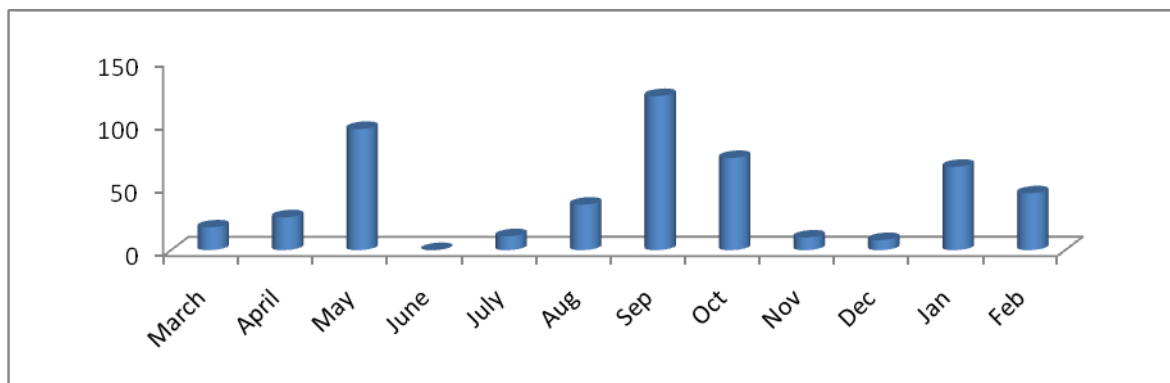


Fig. 10: Population of Glossy ibis.

The Chennai metropolis waste dumpyard occupies a part of these wetlands, and it has effectively choked over 250 acres of prime marsh lands. In spite of the legalized and illicit encroachments, fast developing real estate ventures and various other developments including Information Technology parks on the banks of the marsh lands has aggravated wetland depletion. Realizing the environmental and ecological significance of the area in an expanding metropolis, the Government of Tamil Nadu declared a part of the Pallikaranai marsh (317 ha) as a reserve forest (under section 4 of Tamil Nadu Forest Act, 1882) in order to stall further conversion and protect the urban wetland.

The diversity of avifauna that occur in large numbers in this study area calls for conservation of the Pallikaranai wetlands and prevention from further degradation so that it sustains as wetland posterity offering many ecological services. Conservation of such urban wetlands is essential to sustain to migratory populations, as it is probably an abode during the migratory route, serving a vital role in the conservation of these species. Unfortunately, there are no laws till date to protect urban wetlands in particular, and it is highlighted here for the urgent need for a policy to conserve urban wetlands and related ecosystems.

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