

# Baseline survey of Birds at the Proposed Navi Mumbai International Airport (NMIA) Area

**The birds observed in the mangroves and  
the adjoining areas of the proposed NMIA site**

**TRI-MONTHLY REPORT JULY-SEPTEMBER 2014**



Bombay Natural History Society

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Tri-monthly Report: July to September 2014

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# Baseline Survey of Birds at the Proposed Navi Mumbai International Airport (NMIA)

## The birds observed in the mangroves and the adjoining areas of the proposed NMIA site

Tri-monthly Report: July to September 2014

### Summary

The field visits were conducted between December 2011 and September 2014, in the area that is approximately in the 10-kilometre radius from the proposed site of the Navi Mumbai International Airport (NMIA). Through this tri-monthly report, we present a brief account of the birds observed in the mangroves and the adjoining area of the proposed NMIA site. We are also giving information about seasonal variation in the population of birds in the last three years.

We observed some species of birds using the specific sites for various purposes such as breeding and foraging. The nests of a few water birds like Eurasian Coot *Fulica atra*, Indian Spot-billed Duck *Anas poecilorhyncha*, Lesser-Whistling Duck *Dendrocygna javanica*, Purple Swampphen *Porphyrio porphyrio* and Pheasant-tailed Jacana *Hydrophasianus chirurgus* were observed at some of the wetland areas. Baya Weaver *Ploceus philippinus*, Indian Reed Warbler *Acrocephalus [stentoreus] bruniscens*, Scaly-breasted Munia *Lonchura punctulata*, Plain Prinia *Prinia inornata*, Ashy Prinia *Prinia socialis* were among the species observed nesting in the mangroves and the mangroves-associated plants. We observed a few migratory birds overwintering in the study area.

**Keywords:** Navi Mumbai International Airport, Avifauna, Breeding, Nesting, Tide Timing, Water Level, Congregating Bird Species, Wetland Birds

### Abbreviations used

- 1) NMIA – Navi Mumbai International Airport
- 2) BNHS – Bombay Natural History Society
- 3) JNPT - Jawaharlal Nehru Port Trust
- 4) EIA – Environmental Impact Assessment
- 5) Habitats: P-Paddy Field, GS-Mixed habitat of Grassland and Shrub-land, RS-Rocky Seashore, W-Wetland, MD-Mudflats, MC-Mangrove and Creeks, NH-Near Human Habitation, F-Forest
- 6) Threat categories: EN-Endangered, VU-Vulnerable, NT-Near Threatened
- 7) Type of movements: R-Resident, M-Migratory

## CHAPTER I

### Introduction

According to the Government of Maharashtra, the existing airport at Mumbai is fast reaching saturation level and the scope for further enhancement of passenger and cargo handling facilities, aircraft maintenance and the city-side facilities is limited (EIA Report, CIDCO, Navi Mumbai). The need for a second airport for Mumbai has become inescapable and imperative. City and Industrial Development Corporation of Maharashtra Limited (CIDCO) proposed to set up a new international airport at Navi Mumbai in Maharashtra. The proposed Navi Mumbai International Airport (NMIA) is located near Panvel between the existing National Highway-4B (NH4B) and Aamra Marg in Panvel Tehsil of Raigad district.

The total area demarcated for the airport zone is 2,054 hectares; this includes the area for development; approximately 1,615 hectares as an Airport Zone and the remaining for off-site infrastructure such as diversion, training of rivers, approach roads, etc. Environmental Impact Assessment (EIA) carried out for NMIA by the Centre of Environment Science & Engineering at Indian Institute of Technology Bombay (IIT Bombay), reported 58 species of birds from 21 locations in the 10-kilometre radius area of the proposed NMIA site. The area comprised creeks, rivers and mangroves that serve as a good habitat for a variety of congregating bird species. Karnala Bird Sanctuary is located in proximity to the proposed NMIA site.

The Ministry of Environment and Forests (MoEF), Government of India has granted a conditional clearance to this project. One of the conditions (condition no. xxxi provided under specific conditions) is that an avifaunal study should be carried out in consultation with the Bombay Natural History Society (BNHS). The BNHS survey was designed to document the bird diversity and species composition at various survey sites in the 10-kilometre radius area of NMIA. A total of 260 bird species belonging to 56 families were observed in the study area since December 2011.



Flock of Terek Sandpiper roosting on mangroves in creek

SUJIT NARWADE

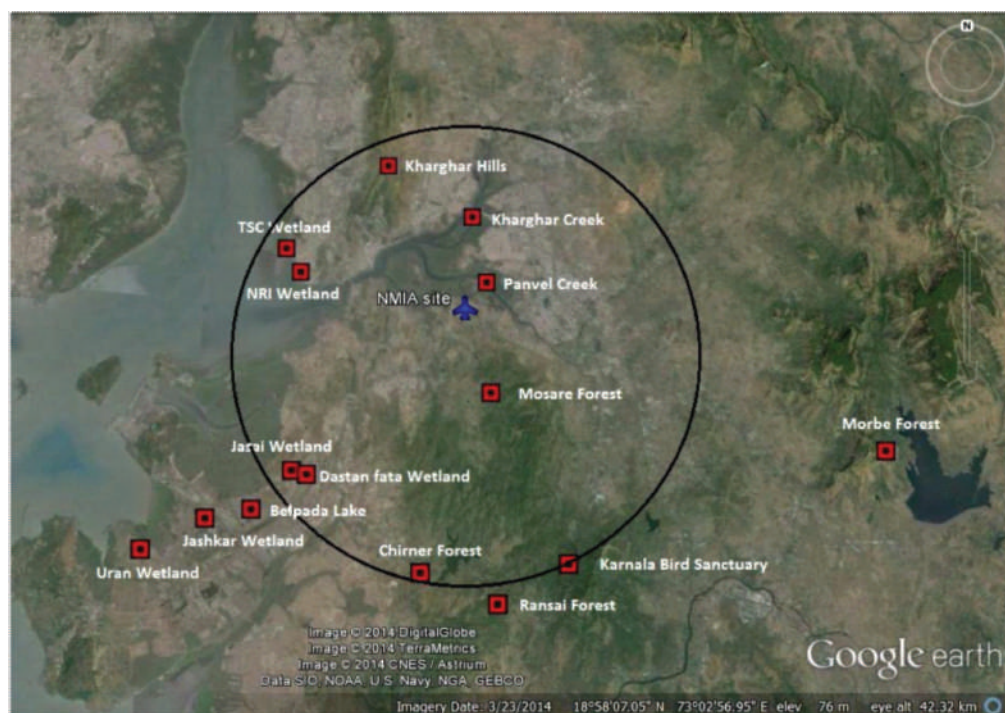
## CHAPTER II

## Study Area

## 2.1 Study sites in the 10-kilometre radius area of the proposed NMIA site

The study area of the 10-kilometre radius from the proposed site of NMIA was divided into five blocks as mentioned below, however, excluding the industrial zones and the areas with dense human habitations (Map 1).

1. **The proposed site of NMIA:** Data was collected from wetlands, creeks, paddy fields, mangrove-covered areas, mudflats, open scrubland and shrub land. The study area included Kombadbhuja, Ulve, Dungi, Pargaon, Chinchpada and Kopar; the villages adjacent to the proposed NMIA site and the creeks at Gadhi, Ulve, Kalamboli and Panvel (see map 2).
2. **North-west:** This block includes the land primarily covered with grass and shrubs, the seashore parallel to Palm Beach Road and a part of Airoli Creek, water bodies around NRI Complex, Delshi Public School (DPS) on Palm Beach Road, Belapur Pond and a portion of Parsik Hills.
3. **North-east:** This block includes Taloja, Panvel, Tembhode, Kewale, Nere and Pali villages, which is a hilly area interspersed with paddy fields, human habitations and grasslands.
4. **South-west or Uran-Jawaharlal Nehru Port Trust (JNPT) area:** This block includes small wetlands, mangroves areas near the villages such as Jasai, Sonari, Belpada, Karal, Gawhan, Uran, Jaskhar and Funde.
5. **South-east:** This block primarily consists of reserve forest patches near villages such as Mosare, Patnoli and Ransai. The southern-moist, mixed-deciduous forest patch was recently added to Karnala Bird Sanctuary, NH17 (National Highway number 17) cuts through this sanctuary.



Map 1: A Google Earth map showing selected study sites in 10 kilometre-radius of proposed NMIA site

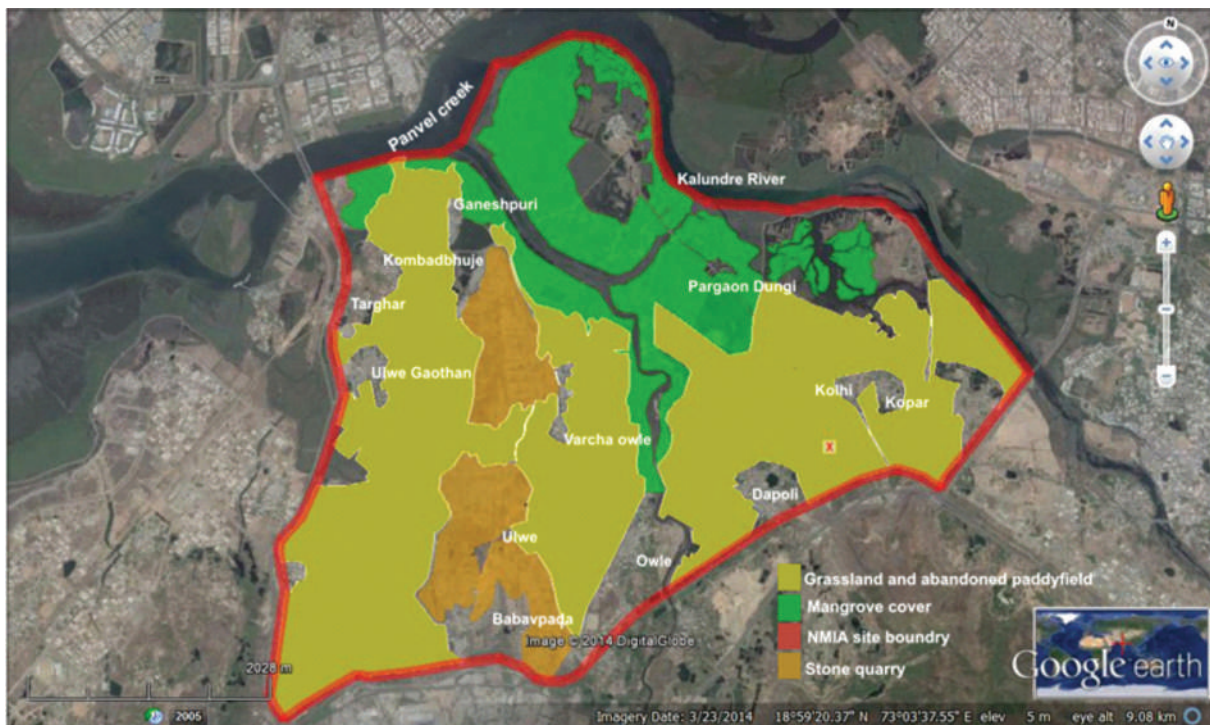


We focussed on the following areas (see Map 1) and collected data on temporal and spatial variation in the population of some congregating bird species:

1. **Belpada Lake:** It is in the southwest direction of the proposed NMIA site near Sonari- Belpada village (18°54'41.97"N – 72°59'43.29"E). This lake is behind the Speedy Services' container yard. Many bird species use the lake for roosting. It is surrounded by grass/shrubland from three sides and the boundary wall of Speedy Services' container yard on the fourth side. This wetland, once connected to the sea by water channels, is isolated, and its water level is not dependent on the tidal cycle; therefore, it dries up in the summer. This lake is reachable from Panvel-JNPT road and is about 2-3 km from Jasai village and about 500 metres from the toll plaza towards Speedy Container Yard.
2. **Panvel Creek:** Waders are usually seen on a rock-bed, exposed during a low tide, in Panvel Creek at the proposed site of NMIA near Kopar and Pargaon villages (19° 0'6.29"N – 73° 5'12.28"E). This site is of mixed habitat and includes mangroves, open scrubland/shrub land, and complex of smaller wetlands created by backwater, paddy fields as well as creeks of Gadhi, Ulve, Kalamboli and Panvel. Roosting of birds was mainly seen in area of about 40 hectares as shown in the map.
3. **Kharghar Creek:** Located between the harbour line railway stations Kharghar and Mansarovar (19° 1'48.76"N – 73° 4'45.46"E), the Creek can be reached by road via the Sion-Panvel Highway. The mangroves adjoining the Creek were surveyed for the study of population of small birds. It was important to know the status of smaller birds that may pose a threat to flight safety in the future because a large portion of the proposed NMIA site is covered by the mangroves.
4. **NRI Wetland:** This site lies in the Northwest direction of the proposed site of NMIA (19° 0'18.02"N – 73° 0'43.68"E). It includes a wetland spread across 19 hectares, surrounded by grass, shrubs and mangroves. Water level in this wetland fluctuates during tides and due to the activities of the local fisherman. During high tide, the water enters the wetland, and it is by small check dams created by the fishermen. Mangroves cover the wetland from three sides and a fenced wall of the NRI Complex on the other hand, with a thin stretch of grass and vegetation in between. Tall vegetation along the borders of the wetland makes it undisturbed and an enclosed habitat for birds. This wetland lies behind the NRI Complex, followed by a stretch of mangroves, and finally reaches the seashore. We observed water birds congregating in this area during early winter and summer. This wetland is also used as a stopover site by a number of migratory birds during the early winter season.
5. **TSC Wetland:** Spread over about 15 hectares, this wetland behind Training Ship Chanakya Maritime Institute (19° 0'56.92"N – 73° 0'19.33"E) by a of paddy , mangroves, . The water level in the wetland is primarily controlled by the local fisherman, as well as by the tidal cycles. Water birds seen preferred to congregate in this area during the summer months. Birds use this site for resting during the high tide. We observed that the migratory birds used this area as a stopover site during winter migration cycles.
6. **Uran-JNPT Area:** There are many small wetlands scattered across the Uran-JNPT area (18°54'3.04"N – 72°57'1.86"E), flocked by waders during low tides. Birds used the wetlands near village Dongri and Funde for resting and foraging. A majority of these wetlands dried completely during late winters. Bird movement here was observed to be tide-dependent. Many birds were seen resting and foraging during low tide, in shallow waters.



7. **Wetlands at Jaskhar and Nhava Sheva Police Station:** Two wetlands, one at Jaskhar ( $18^{\circ}54'33.09''\text{N} - 72^{\circ}58'44.33''\text{E}$ ) and another on the west of Nhava Sheva Police ( $18^{\circ}54'53.36''\text{N} - 72^{\circ}58'16.46''\text{E}$ ). In the monsoons, the grassland patches turn into temporary wetlands. We observed overwintering populations of a few migratory birds. Birds were often observed resting at this site during a high tide.
8. **Forest areas:** We surveyed the forest areas in Chirner ( $18^{\circ}53'4.43''\text{N} - 73^{\circ} 3'22.50''\text{E}$ ), Mosare ( $18^{\circ}57'23.97''\text{N} - 73^{\circ} 5'8.47''\text{E}$ ), Ransai ( $18^{\circ}52'24.45''\text{N} - 73^{\circ} 5'10.70''\text{E}$ ) and Karnala Bird Sanctuary ( $18^{\circ}53'39.97''\text{N} - 73^{\circ} 6'57.50''\text{E}$ ). The forest in these areas is the mixed deciduous type, dominated by Jamun *Syzygium cumuni*, Goose Berry *Zizipus mauritiana*, Banyan *Ficus bengalensis*, Teak *Tectona grandis*, Red Silk Cotton *Bombax ceiba* and Anjan *Hardwickia binata*. The land-use pattern includes forest, grassland, agriculture and plantation in Chirner, Mosare, Ransai and Patnoli. The Chirner forest was seen interspersed with the patches of Mango orchards and Teak and Cashew plantations. Karnala Bird Sanctuary a protected area and a mixed deciduous forest here provides the most suitable habitat for the forest dwelling birds.



Map 2: Google earth map of NMIA site highlighting land use pattern.

## 2.2 Brief description of NMIA site and land use pattern

The study area ( $N 18^{\circ}59'20.37'' - E 73^{\circ}03'37.55''$ ) can be broadly classified into four categories on the basis of land use pattern, and our field observations 1] Mangrove cover; 2] Grassland, paddyfields and abandoned salt-pans; 3] Stone quarry sites and 4] the area under urbanisation. The grassland, paddyfield and abandoned salt-pans form a major part of the airport site; about 51 percent, followed by the mangrove forests 20 percent. The area under urbanisation is about 19 percent while the area under stone quarry is 9 percent of the total study area. (please see map 2 for details).

## Chapter III

### Methodology

Multiple site surveys were conducted between December 2011 and June 2014. We used binoculars (Nikon Monarch 10x X 40x) for correct bird identification and a digital SLR-camera (Cannon 550D, Cannon with 400 mm fixed-focus lens) for documentation of bird-species and observations at each survey site. The bird species were recorded (sighting or call) on the field, and direct observations were made by walking along roads, hills, forest-paths, wetlands, mangroves and creek areas.

The birds were identified by referring to, Ali & Ripley (1983), Grimmett et. al (1998) and Rasmussen & Anderton (2012). The list of birds was arranged family-wise following Manakadan & Pittie (2001), and Rasmussen & Anderton (2012) was followed for the nomenclature. A GPS device was used to collect accurate geographical coordinates.

### Sampling Method for Wetland

Every site was visited at least once in a month and birds were counted using the Estimated-block Method (Bibby, et al. 2000) for different species, according to the congregation size during roosting time. The observations were recorded continuously for two hours before and after high tide for each wetland, and the bird count was plotted for every 30 minutes to understand the change in the bird population from low tide to high tide. To understand the trends in population, diversity and movement of birds in wetlands at proposed NMIA site, the quantitative data was collected and the maximum count of individuals of a species in a season was compared across seasons and presented through graphs. The Total Count Method was used to estimate the count of congregating waterbirds and waders during High Tide Wetland Surveys (Koffijberg et al. 2003, Donald and Clark, 1991) and the total bird count during the high tide roost at Palm Beach Road wetland was compared across the months.

### Sampling method in Mangroves and Grassland

Based on the known information and the Google Earth images we selected transects of one kilometre; one in a grassland and the other in the mangroves. The lines were positioned randomly in the survey region and visited monthly once. Strip transect sampling method was used and birds were counted within 50 m distance from the line (Buckland, 2008), and walked approximately 1 km about 20 minutes duration during morning 6.30 am to 9.00 am and 4.00 pm to 6.00 pm. We considered winter from October to December, late winter from January to March, summer from April to June and monsoon from July to September for getting information about seasonal variation in population of birds. For getting abundance data mean numbers of birds of each species encountered per transect was counted and number of individuals of each species was summed up for all transects and divided by total length of transects covered (Bibby et. al. 2002). Recorded the number of individuals of all bird species seen or heard from transect line. The same bird was not recorded twice during the transect.

Abundance i.e. birds per transect area (10 ha) was estimated by dividing the count N by the total area covered in n number of transects during particular season.

$$D = N/A$$

Where N = total number of individuals encountered, and  $A = 2 \times W \times L \times n$  where L is the total length of transect (1 km), w is strip half width (50m), n is number of transect laid



The maximum abundance of a season was considered for plotting the graph of seasonal variation in abundance of birds in mangroves and grassland of proposed NMIA site.

We found that site-specific avifaunal diversity is dynamic and depends on various factors such as the water level, seasonal variations and daily changes in tide levels. These sites were seen used by migratory birds for foraging and resting during high tide resulting in the fluctuations in the species composition temporally and spatially.



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**Congregation of ducks at JNPT lake**



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**Large congregation of Lesser Flamingo, a near threatened species at wetlands of Palm Beach Road area was usually seen during high tide**

## CHAPTER IV

## Observations

## 4.1 NMIA site specific observations

Species count was recorded throughout the year 2013 in the selected habitat of proposed NMIA site. The population of birds was observed fluctuating with the tide level and seasons. The detailed habitat-wise observations are as follows

## 4.1.1 Birds of Creek and Wetland

Two arms of the Panvel creek were seen filled with water during high tide, and benthos getting exposed during low tide. The population of birds in open creek was seen increasing with the decreasing tide level. Majority of the population of migratory birds was seen during March-April months.

We observed 500 Pacific Golden Plover *Pluvialis fulva* foraging in the creek along with 100 Black-winged Stilt *Himantopus himantopus* and 100 Eurasian Curlew *Numenius arquata*, during late winter. All the birds were seen foraging in the creek during low tide and later seen resting in the adjoining wetlands during high tide. A couple of hundred individuals of Indian Shag *Phalacrocorax fuscicollis* and Little Cormorant *Phalacrocorax niger* were seen in the area. Thousands of Indian Shag *Phalacrocorax fuscicollis* were seen passing through the NMIA creek and moving towards Belapur in the evening for roosting. In late winter and summer, three duck species – Indian Spot-billed Duck *Anas poecilorhyncha*, Northern Pintail *Anas acuta* and Northern Shoveler *Anas clypeata* – were seen resting in smaller flocks of 10-15 individuals in the creek area (Figure 1A).

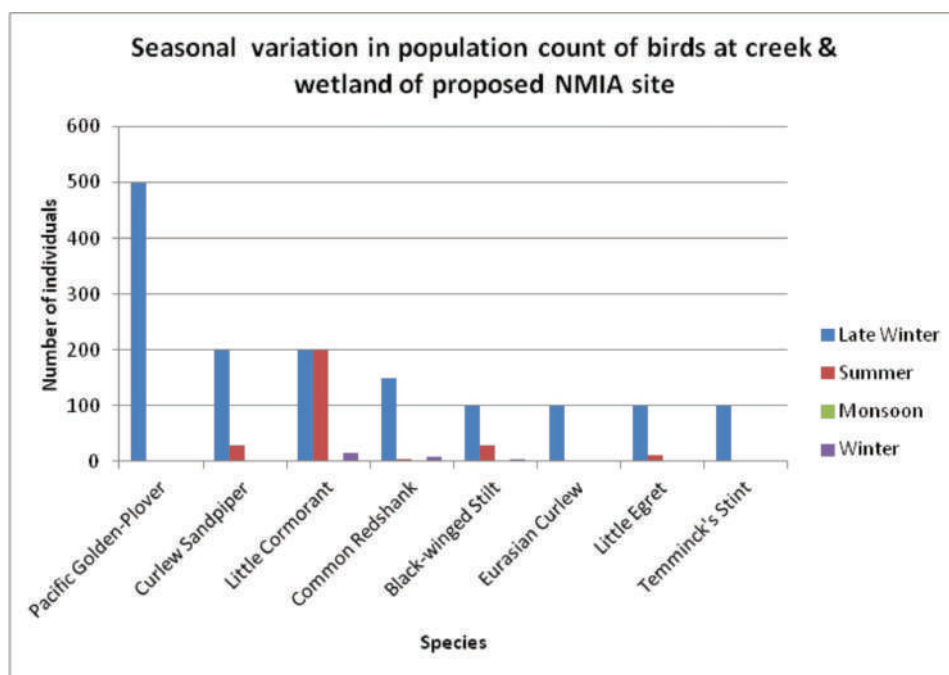


Fig 1A: Seasonal variation in population of birds species at the creek and wetland of the proposed NMIA site



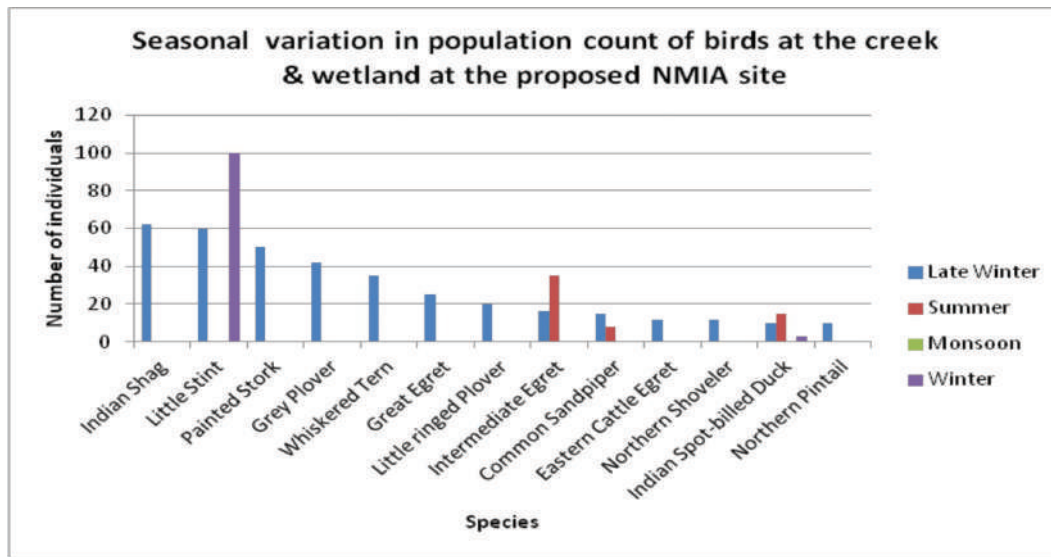


Fig 1B: Seasonal variation in population of birds including species with count of less than 100 individuals in the creek and the wetland at the proposed NMIA site

We observed a flock of about 100 Curlew Sandpiper *Calidris ferruginea*, 150 Common Redshank *Tringa totanus*, about 60 Little Stint *Calidris minuta* and 100 Temminck's Stint *Calidris temminckii* in a cluster of smaller wetlands in the area. Along with the migratory birds, a few resident species such as Eastern Cattle Egret *Bubulcus coromandus*, Intermediate Egret *Egretta intermedia* and Great Egret *Egretta alba* were seen foraging throughout the winter and summer. In the monsoons, tall vegetation obstructs the access to the creek and the wetland. Occasionally, Painted Stork *Mycteria leucocephala* was seen in the wetland during winter and once we observed over 50 individuals foraging in the area and roosting in the mangroves at NMIA site (Figure 1B).

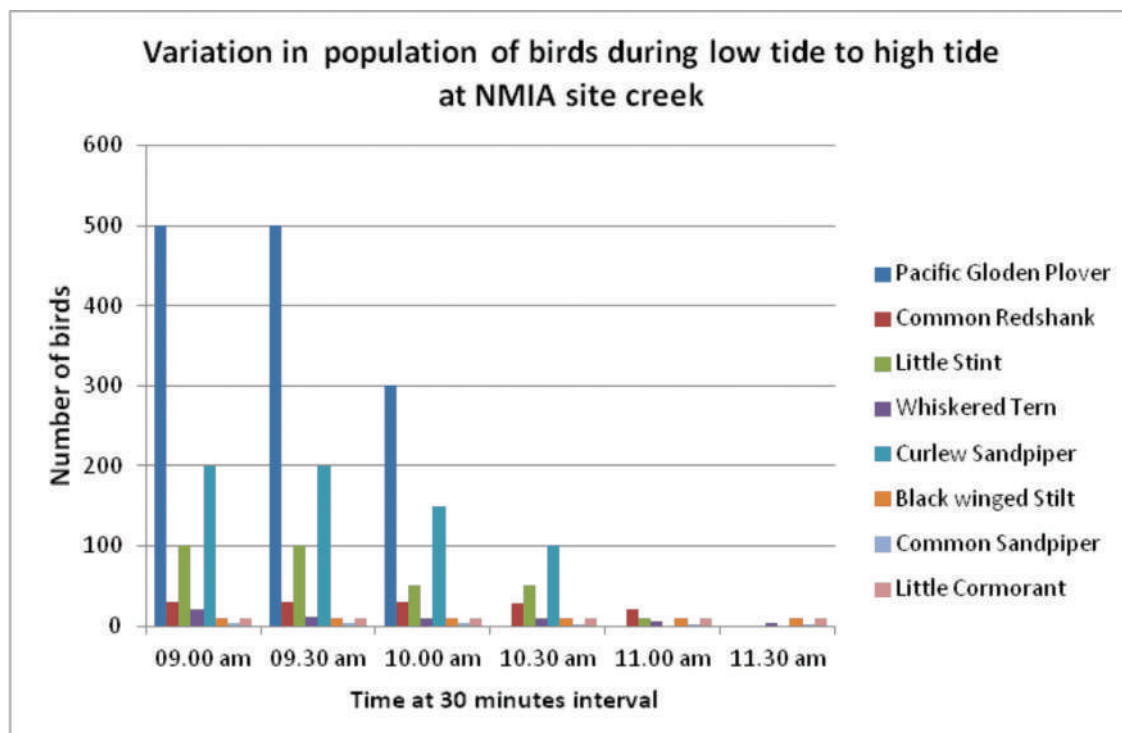


Fig 2: Variation in population of birds during low tide to high tide at the creek at the proposed NMIA site

To study the tide dependent movement of birds, we are providing here observations carried out on 12th February 2013. We started the observation at low tide from 09.00 am when birds were seen foraging in the open mudflats. We recorded about 500 Pacific Golden Plover *Pluvialis fulva*, 30 Common Redshank *Tringa totanus*, 100 Little Stint *Calidris minuta*, 200 Curlew Sandpiper *Calidris ferruginea*, 10 Black-winged Stilt *Himantopus himantopus*, three Common Sandpiper *Tringa hypoleucos* and 10 Little Cormorant *Phalacrocorax niger*. It was observed that birds started flying towards the adjoining wetlands during high tide from about 12.30 pm onwards. The water level had started rising in the creek since 10.30 pm on the earlier night (Figure 2, on page 9).



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**Congregation of Pacific Golden Plover in Panvel creek during Low tide**



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**Indian Shag at Panvel creek during Low tide**





Waders at NMIA area

#### 4.1.2 Mangrove areas

Biodiversity is prevalent in the tropical estuarine system, particularly in the intertidal forested vegetation known as Mangrove (Mooney et al. 1995). The mangrove vegetation possesses many structural and physiological peculiarities and is composed of species with strongly marked characteristics grouped under 'true mangroves'. There are also plants with less strongly marked characteristics, which are known as semi-mangrove (Tansley & Fritch, 1905). There is yet another group of plants, which grow adjoining the mangrove areas but thrive on the land which does not submerge by brackish water even during the high tides, but can withstand some amount of brackish water stagnation for the short period. These can be grouped as mangrove associated species (Basha, 1992).

Mangrove species found at the proposed NMIA site are *Avicenna marina*, *Acanthus ilicifolius* and the associated plant species such as Glory Bower *Clerodendrum inerme*, Common Deris *Derris trifoliata*, Sea Purselane *Sesuvium portulacastrum*, Meswak *Salvadora persica*. The dominant mangrove species of the west coast is *Avicennia marina*. It has high salt tolerance among all the mangroves. They are shrubby trees with an average height between three to seven metres.



*Avicenna marina* a dominant mangrove species in NMIA area





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*Clerodendrum inerme*- a common mangrove associated plant found in study area



PRIVANKA AMBAVANE

*Acanthus ilicifolius* - another common mangroves species of study area

The mangroves at the proposed NMIA site provide a habitat for a variety of bird species such as Indian Reed-warbler *Acrocephalus stentoreus*, Plain Prinia *Prinia inornata*, White-eared Bulbul *Pycnonotus leucotis*, Ashy Prinia *Prinia socialis*, Little Egret *Egretta garzetta* and Little Cormorant *Phalacrocorax niger*. We observed seasonal fluctuation in the population of these bird species.

In 2013, we particularly observed large number of Little Cormorant *Phalacrocorax niger* and Little Egret *Egretta garzetta* in the area. Ashy Prinia *Prinia socialis* and Plain Prinia *Prinia inornata* were particularly vocal, and were seen perching and flying from one perch to another. Indian Reed Warbler *Acrocephalus [stentoreus] brunescens* were often heard in the mangroves, with occasional record in flight. Scaly-breasted Munia *Lonchura punctulata*, Tricoloured Munia *Lonchura malacca* and White-cheeked Bulbul *Pycnonotus leucotis* were often seen in the mangroves (Fig 3A).

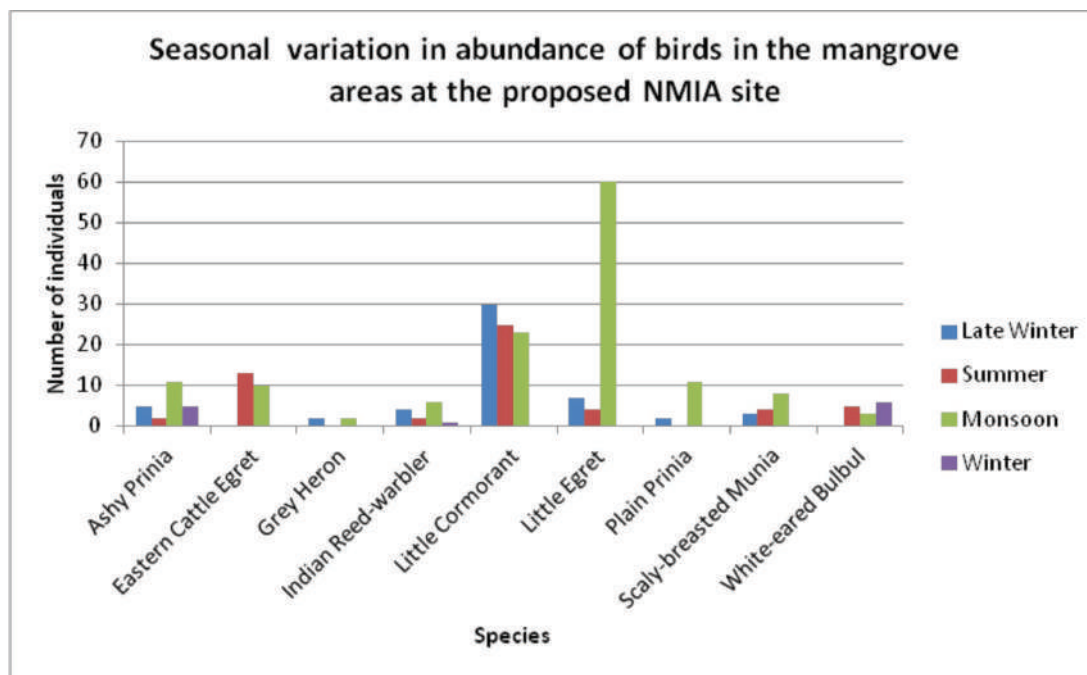


Fig 3: Seasonal variation in abundance of birds in the mangrove areas at the proposed NMIA site

During winter, we observed a flock of Rosy Starling *Sturnus roseus* foraging and roosting in the mangroves. The other birds including Blyth's Reed Warbler *Acrocephalus dumetorum*, Lesser Whitethroat *Sylvia curruca*, Yellow-eyed Babbler *Chrysomma sinense*, Purple Sunbird *Cinnyris asiaticus*, Red Avadavat *Amandava amandava*, White-browed Fantail Flycatcher *Rhipidura aureola*, Common Tailorbird *Orthotomus sutorius*, Long-tailed Shrike *Lanius schach* and Baya Weaver *Ploceus philippinus* were often seen perching on the mangroves. Raptors such as Black Kite *Milvus migrans*, Black-winged Kite *Elanus caeruleus*, Osprey *Pandion haliaetus*, Booted Eagle *Hieraaetus pennatus* and Western Marsh Harrier *Circus aeruginosus* were observed flying over and perching on the mangroves at the proposed site of NMIA and the adjoining areas. The species diversity fluctuated through seasons and was highest during the monsoon.





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**Baya Weaver roosting in mangroves of NMIA site**



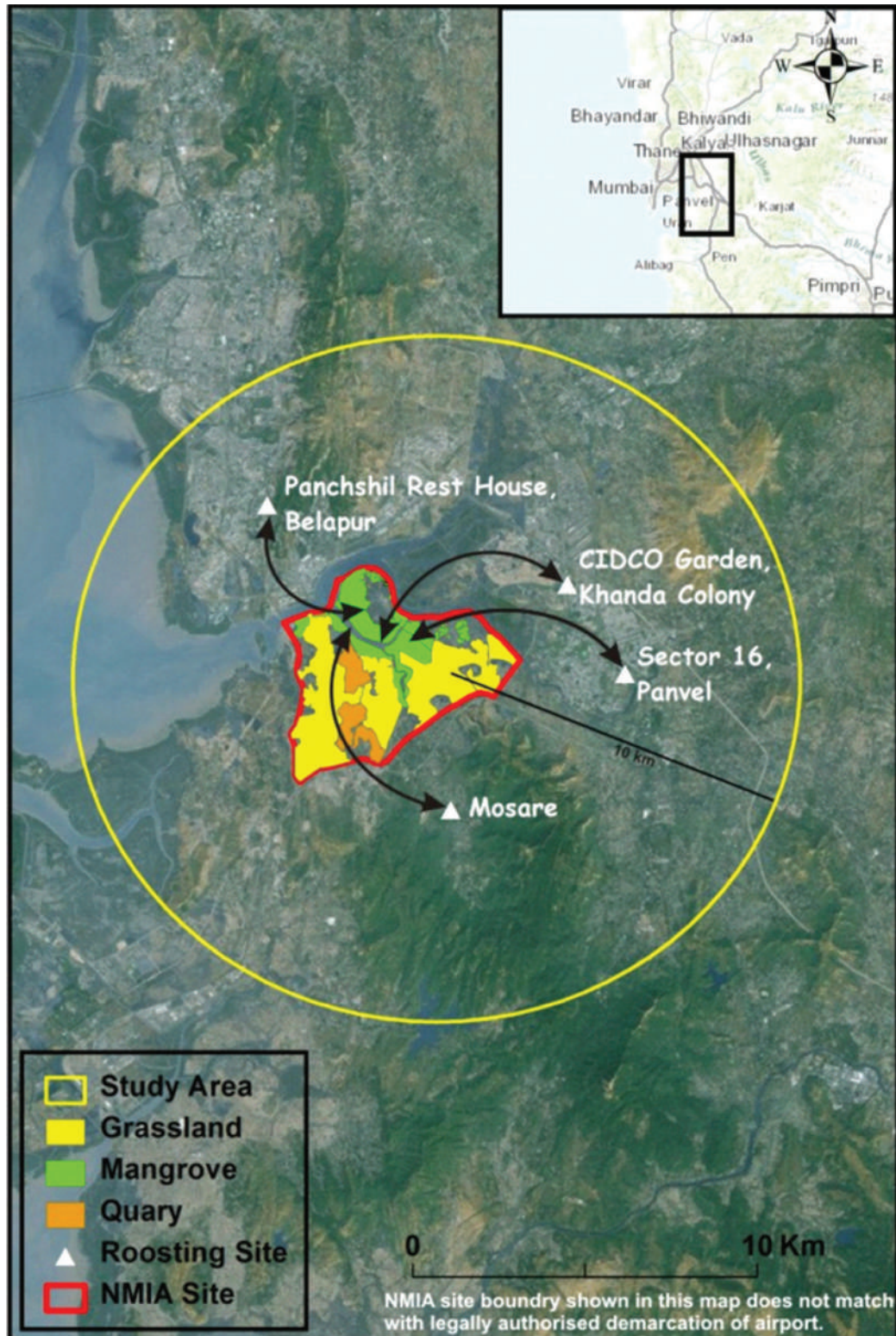
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**White-eared Bulbul, one of the commonest bird species inhabiting mangroves of study area**



### A. Bird roosting in the mangroves

Mangroves are used for roosting by birds such as Grey Heron *Ardea cinerea*, Purple Heron *Ardea purpurea*, Eurasian Spoonbill *Platalea leucorodia* and Black-headed Ibis *Threskiornis melanocephalus*. During winters, a large number of Rosy Starlings *Pastor roseus* were seen foraging and resting in the mangroves. The birds were often seen foraging on the open mudflats during a low tide at the proposed NMIA site and resting in the mangroves during a high tide. During monsoon, many water birds were seen foraging in puddles in the adjoining grasslands.



Map 3: Map showing movement of birds between the foraging sites and roosting sites



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**Mangroves habitat of Panvel creek**



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**Indian Shag perching in Mangroves of NMIA area during High tide**



The birds such as Red-vented Bulbul *Pycnonotus cafer*, Red-whiskered Bulbul *Pycnonotus jocosus*, Cattle Egret *Bubulcus ibis*, Indian Pond Heron *Ardeola grayii*, Little Egret *Egretta garzetta* and Purple Sunbird *Cinnyris asiaticus* were often seen moving from grasslands to the mangrove areas. These birds were observed using the grassland areas for foraging and the mangroves for perching. Painted Stork *Mycteria leucocephala*, Eurasian Spoon-bill *Platalea leucorodia*, Asian Openbill *Anastomus oscitans*, Grey Heron *Ardea cinerea*, and Purple Heron *Ardea purpurea* were often seen foraging on open mudflats during low tide and roosting in the mangroves during high tide at the proposed NMIA site. We observed that the birds such as Indian Shag *Phalacrocorax fuscicollis*, Little Cormorant *Phalacrocorax niger*, Little Egret *Egretta garzetta* and Intermediate Egret *Ardea intermedia* visited the mangroves for foraging from the tree roosting areas that were within the 10-kilometre radius of the proposed NMIA site. These birds came for foraging at the proposed NMIA site during the day time and returned in the late evening (Map 3).



Purple Heron found roosting in mangrooves



Painted Stork were seen roosting in mangroves occasionally



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A big roosting colony of Indian Shag at Panchashil rest house, Belapur

## B. Birds breeding in the mangrove areas

Mangroves are used by many bird species for resting. The resident bird species often used the mangrove areas for breeding also. The higher density of mangroves make them a secure habitat for a nest and the fledglings. While surveying the mangroves at the proposed NMIA site in June 2014, we observed increased activity of Indian Reed Warbler *Acrocephalus stentoreus*. The birds were continuously calling from various directions. On further investigation, we found that a bird was sitting on the nest and was shaping it to perfection. The cup-shaped nest, made with fine grass blades, was about four feet above the ground on a *Avicennia marina* tree. The nest was well camouflaged in the mangroves. We found a similar nest located about five feet from the first nest. We visited the site again in the subsequent week but due to thick growth of the mangrove associated plants we could not get close enough to the nest for us to be able to record any observations.

Ashy Prinia *Prinia socialis*, Plain Prinia *Prinia inornata*, Scaly-breasted Munia *Lonchura punctulata*, Baya Weaver *Ploceus philippinus* and White-eared Bulbul *Pycnonotus leucotis* were also seen breeding in the mangroves and associated plants, especially in the monsoon.





SUJIT NARWADE

**Nest of Baya weaver in Mangrove areas**



**First Photographic record of Indian Reed Warbler in mangroves of Navi Mumbai Area**

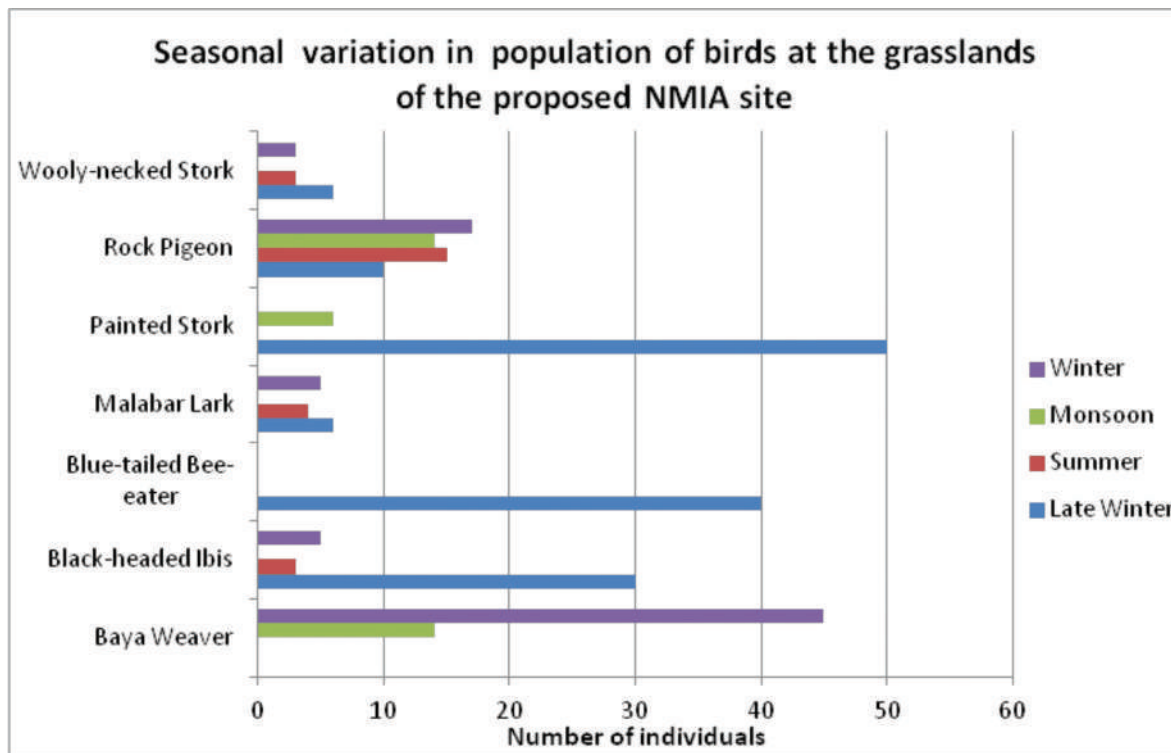


Fig 4: Seasonal variation in population of birds at the grassland of the proposed NMIA site

### Grassland and Shrubland

The small birds such as larks, pipits and buntings used the grass and shrub areas at the proposed NMIA site as the foraging grounds. In the winter of 2013 we observed a flock of 50 Baya Weaver *Ploceus philippinus* and 100 Black-headed Bunting *Emberiza melanocephala* foraging in the grassland and paddy fields at the proposed NMIA site, and roosting in the adjoining mangrove areas. Earlier in the winter of 2012, we recorded about 500 Black-headed Bunting *Emberiza melanocephala* and 500 Baya Weaver *Ploceus philippinus*. In 2014, we saw about 200 Streak-throated Weavers *Ploceus manyar* in the same area. They were seen foraging in the paddy fields and grassland areas at the proposed NMIA site, and roosting in the mangroves in the vicinity. Rufous-tailed Lark *Ammomanes phoenicurus*, Malabar Lark *Galerida malabarica* and Paddy-field Pipit *Anthus rufulus* were seen foraging in the grasslands. In the evening larks and pipits were seen roosting on ground. During winter, Black-headed Ibis *Threskiornis melanocephalus* and Woolly-necked Stork *Ciconia episcopus* were seen roosting the grassland and later moving to adjoining wetlands, in the small groups of about 10 to 12 individuals. We observed a flock of about 30-40 Blue-tailed Bee Eaters *Merops philippinus* – a passage migrant species – during August-September through 2012 to the 2014 (Figure 4).

In September 2014, we observed a couple of breeding colonies with about 10 nests of Baya Weaver *Ploceus philippinus*. The nests were seen on the trees in the shrub land as well as in the mangrove areas. The Weaver males made the nest – a hanging-bag like structure, with a tubular entrance – with closely woven grass blades. We also saw the nests of Red-wattled Lapwing *Vanellus indicus*, made with pebbles arranged on open ground. The Lapwing parents were observed chasing other birds and animals which came closer to their nests. We observed the hatchlings and the dull coloured chicks later. We recorded a few nests of Scaly-breasted Munia *Lonchura punctulata* and Long-tailed shrike *Lanius schach* on the *Acacia* sp. trees.





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**Flock of Black-headed Bunting was seen foraging in paddy field areas and resting in mangroves at NMIA site**

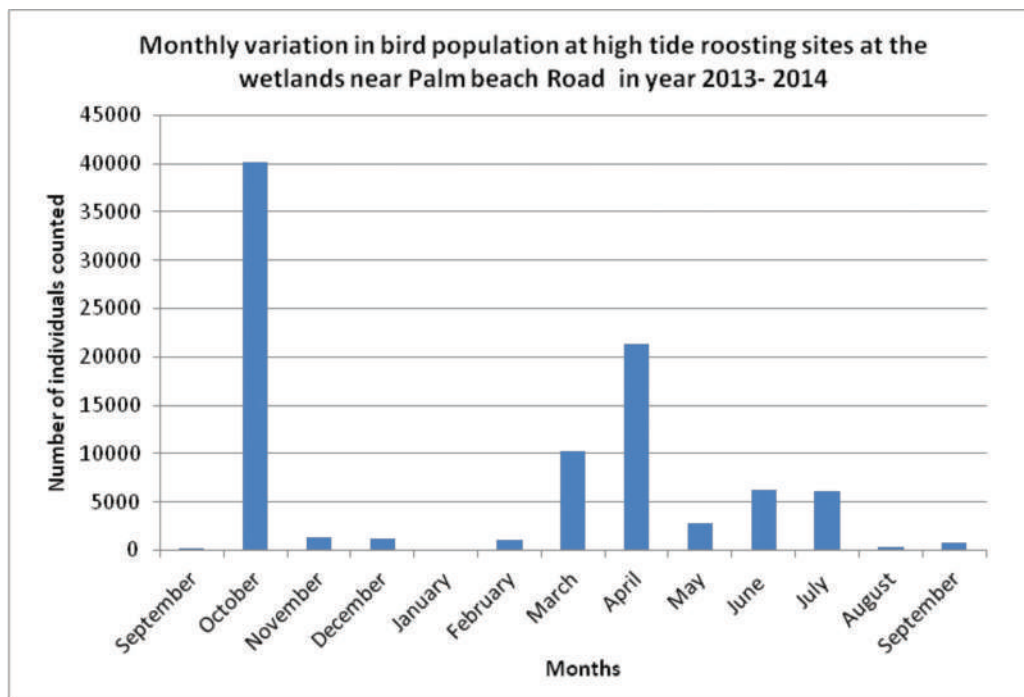


SUJIT NARWADE

**Near threatened species such as Painted Stork and Woolly-necked Stork were seen in NMIA site**

#### 4.2 Tide dependent roosting of birds in the study area

Many coastal shorebirds are specialized to feed on inter-tidal mudflats which can be used during low tide. At high tide, the birds are usually forced to alternative resting sites, known as high tide roosts. Shorebirds spend much time roosting, and individual roosts may hold thousands of birds at one time. High-tide roosts tend to be small areas on coastlines near to but just above the tide line, a combination of characteristics that makes them vulnerable to human development or disturbance (e.g. Mitchell *et al.* 1988).

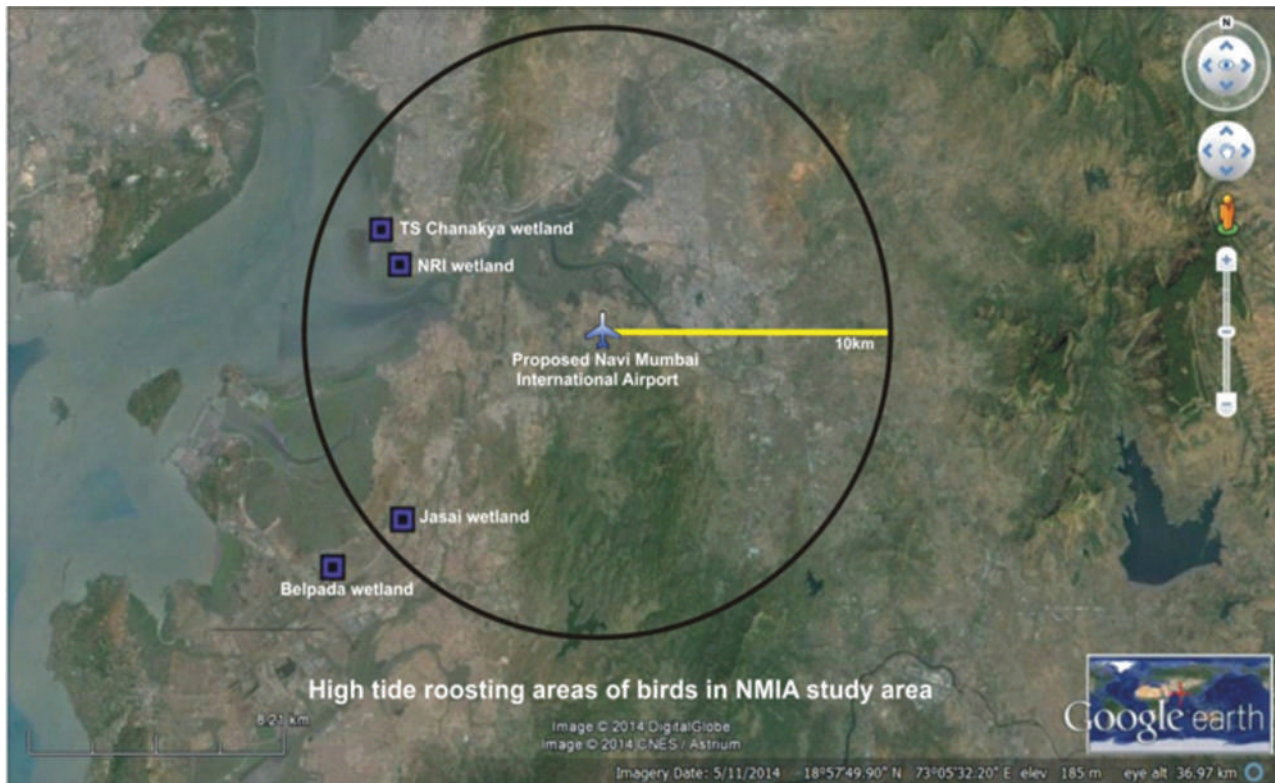


**Fig 5: Monthly variation in bird population at high tide roosting sites at the wetlands near Palm beach Road in year 2013- 2014**

Since 2012, we are observing communal roosting of birds, during the October to May period at the wetlands near NRI and Training Ship Chanakya on the Palm Beach Road and the wetlands in the Uran area. The roosting bird species include Lesser Flamingo *Phoeniconaias minor*, Lesser Sand Plover *Charadrius mongolus*, Greater Sand Plover *Charadrius leschenaultia*, Grey Plover *Pluvialis squatarola*, Eurasian Curlew *Numenius arquata*, Common Redshank *Tringa totanus*, and Little Stint *Calidris minuta*. These birds are seen moving in flocks from these roosting sites to the creeks and open mudflats on the seashore for foraging during low tide and returning during high tide (Map 4). We observed two peaks in the monthly variation in population of roosting birds; one in October 2013 when we counted about 40,000 birds and other in April 2014 when over 20,000 birds were seen at the Palm Beach Road area (Figure 5).

In our study, we observed that the birds use different sites in different seasons. Tide and water level are influential factors, resulting into seasonal variations in the species abundance at roosting and foraging sites. Roosting sites such as wetlands near NRI Complex, the proposed NMIA site, Sonari-Belpada and TSC and the adjoining mangroves hold a considerable bird populations (Map 5).





**Map 5: High tide roosting areas of birds in NMIA study area.**

It is known that the choice of a day roost was affected by its distance from the feeding area and other micro-climatic conditions (Rogers et. al. 2006). Birds select day roosts closer to the feeding areas, while during night, birds select safer but more distant roosts (Rogers et al. 2006). It was observed that by in communal roosting, birds are benefited by increased ability to spot approaching predators, opportunity to explore new feeding areas (Donald & Clark 1991). We reckon it would be necessary to study the long-term impact of rapidly changing environment on the birds in the study area and correlate it with the status of birds in their breeding grounds. It will give idea about how particular species is doing at local as well as global level.

During the arrival period of migratory birds in October each year, as well as during the departure time in April, we recorded a sharp fluctuation in the population of birds in the study area (Narwade et. al. 2012). This indicates that birds use this area on arrival and then later get distributed. It was observed that the birds usually congregate in the shallow waters and the population of the congregating birds in different roosting areas is affected by a number of factors. In 2014, we recorded a sudden increase in the population of Lesser Flamingo *Phoenicopterus minor*, especially the juveniles, which indicates a good season for these birds at the breeding site.





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**Waders and Gulls were seen resting during high tide at TS Chanakya wetland**



SUJIT NARWADE

**TS Chanakya wetland is regular resting place for birds like Lesser Flamingo during high tide**





SUJIT NARWADE

Very few areas have escaped from human development around Mumbai where migratory birds can congregate for resting during high tide; like TS Chanakya wetland



MRUGANK PRABHU

Panje Uran is also one of the few ideal habitats for bird congregation around Mumbai and Navi-Mumbai city

### 4.3 Observations of birds in the 10-kilometre radius area of the proposed NMIA site

Here we would like to give a brief account of species observed at following selected sites.

#### 4.3.1 Wetland areas

The selected sites were visited at least once in every month. Wetlands and other roosting sites were visited more often to record the observations of population fluctuations in the congregating birds.

##### NRI Wetland

This study area was often visited during various tide levels. Cormorants, Egrets, Painted Stork *Mycteria leucocephala* and Lesser Flamingo *Phoenicopterus minor* were seen in the wetlands, whereas the smaller birds occupied the comparatively shallow and the open marshy patches in the mangroves adjacent to NRI Wetland.

On July 22, 2014, we observed a flock of around 300-400 Lesser Flamingo *Phoenicopterus minor* and a few individuals of Little Egret *Egretta garzetta*, six Painted Storks *Mycteria leucocephala*, a couple of Grey Herons *Ardea cinerea* and two Spot-billed Ducks *Anas poecilorhyncha* foraging in the wetland. In the mangroves, a small flock of about 20 Eurasian Curlews *Numenius arquata*, two Whimbrels *Numenius phaeopus*, 15 Caspian Terns *Sterna caspia*, 60 Common Redshanks *Tringa totanus* and two Black-tailed Godwits *Limosa limosa* were seen resting. We heard Indian Reed Warbler calling from the stretch of mangroves. Asian Pied Starling *Gracupica contra*, Ashy Prinia *Prinia socialis*, Plain Prinia *Prinia inornata* and Yellow-eyed Babbler *Chrysomma sinense* were seen perching on the grasses on the edges of the mangroves.

On August 7, 2014, NRI wetland was full of water, and a few Little Egrets *Egretta garzetta* and Great Egrets *Ardea alba* were seen foraging in the wetland. Not a single Lesser Flamingo *Phoenicopterus minor* was seen; perhaps because of their return migration to the breeding grounds. The high water levels in the wetland forced the birds to rest in the mudflats surrounded by mangroves. About 10 Gull-billed Terns *Gelochelidon nilotica*, 10 Caspian Terns *Hydroprogne caspia* and 20 Eurasian Curlews *Numenius arquata*. and a couple of Common Kingfishers *Alcedo atthis* were seen. Indian Reed Warbler *Acrocephalus stentoreus*, Scaly-breasted Munia *Lonchura punctulata* and Ashy Prinia *Prinia socialis* were seen perching on the mangroves and the associated plants.

On August 21, 2014, we observed a congregation of about 100 Eurasian Curlews *Numenius arquata*, 50 Whimbrel *Numenius phaeopus*, 60 Caspian Terns *Sterna caspia*, 15 Whiskered Terns *Chlidonias hybrida*, 50 Gull-billed Terns *Gelochelidon nilotica*, 10 Grey Plovers *Pluvialis squatarola* and 35 Common Redshank *Tringa totanus* resting in the mangroves.

From September 2014, we visited this wetland more frequently to monitor the arrival of migratory birds. On September 8, a mix flock of about 400 Gull-billed Terns *Gelochelidon nilotica* and Whiskered Tern *Chlidonias hybrida* were seen resting in the mangroves. About 20 individuals of Eurasian Curlew *Numenius arquata* and a few Common Redshank *Tringa totanus*, Common Greenshank *Tringa nebularia*, two individuals of Grey Plover *Pluvialis squatarola* and a couple of Caspian Tern *Hydroprogne caspia* were also seen. On September 11, we recorded about 100 individuals of Painted Stork *Mycteria leucocephala*, including the 12 drab-coloured juveniles. In the mangroves, a small flock of waders such as Curlew Sandpiper *Calidris ferruginea*, Little Stint *Calidris minuta* and Common Redshank *Tringa totanus* was seen in their breeding plumage. On September 24, we observed 10 Spot-billed Duck *Anas*



*poecilorhyncha* and a female Comb Duck *Sarkidiornis melanotos* in the wetland. We recorded only 15 individuals of Painted Stork *Mycteria leucocephala* on September 24, as compared to about 100 individuals on the previous visit on September 11. Black-winged Stilt *Himantopus himantopus* were not observed in this wetland during the July and August period in 2014. They were seen in a group of 100 individuals in September 2014, including a few juveniles. This observation suggests that the Black-winged Stilt is a local migrant in the study area, possibly moving elsewhere for breeding.



MRUGANK PRABHU

Early arrival of Terns and Gulls can be seen in wetlands of NRI in study area



MRUGANK PRABHU

Over wintering population of some water birds like Eurasian Curlew was seen during Monsoon season in study area





SUJIT NARWADE

Population of water birds was seen influenced by water availability in particular wetland

### TSC Wetland

This wetland is visible from the Palm Beach Road, opposite to Training Ship Chanakya. The species diversity and population of birds was very less during the July to August period in 2014, primarily because of absence of the migratory birds in monsoon and high water level in the wetland.

We saw only a few birds in the wetland on July 22, 2014 because of high water level. We recorded four individuals of Lesser Flamingo *Phoenicopiterus minor* foraging at the wetland and two individuals of Caspian Tern *Hydroprogne caspia* and four Slender-billed Gull *Chroicocephalus genei* and few Intermediate Egrets *Ardea intermedia* were seen resting on edges of the wetland. In August 2014, we observed only a few Cattle Egret *Bubulcus ibis* and Intermediate Egret *Ardea intermedia* in the wetland.

On September 24, 2014, we observed a congregation of about 2,000 waders, resting in a compact flock. The congregating birds included Curlew Sandpiper *Calidris ferruginea*, Terek Sandpiper *Xenus cinereus*, Pacific Golden Plover *Pluvialis fulva*, Ruff *Philomachus pugnax*, Common Redshank *Tringa totanus*, Broad-billed Sandpiper *Limicola falcinellus* and Little Stint *Calidris minuta*.

## Belpada Lake

Indian Spot-billed Duck *Anas poecilorhyncha*, Purple Swamphe *Porphyrio porphyrio*, Eurasian Coot *Fulica atra*, Pheasant-tailed Jacana *Hydrophasianus chirurgus* and Bronze-winged Jacana *Metopidius indicus* used Belpada Lake as a breeding ground. On July 24, 2014, we observed around 50 individuals of Little Grebe *Tachybaptus ruficollis* and 50 Intermediate Egret *Mesophoyx intermedia*, Little Egret *Egretta garzetta*, Cattle Egret *Bubulcus ibis* and Great Egret *Ardea alba* in the wetland. A Watercock was observed in the marshes along with Bronze-winged Jacana *Metopidius indicus*, Common Moorhen *Gallinula chloropus* and Eurasian Coot *Fulica atra*.

In August 2014, we observed nesting activities of Eurasian Coot *Fulica atra* and Lesser Whistling Teal *Dendrocygna javanica*. The nests were seen in the marshes along the edges of the lake. On August 20, we recorded 20 individuals of Whiskered Tern *Chlidonias hybrida*, 20 Little Cormorant *Phalacrocorax niger* and a few egrets resting on the bunds of the lake. Two Asian Openbill *Anastomus oscitans* were seen in flight.

In the second week of September 2014, a drainage outlet was prepared by adjoining Speedy Container yard for draining the water. We observed 30 individuals of Eurasian Coot *Fulica atra*, 20 Pheasant-tailed Jacana *Hydrophasianus chirurgus*, 200 Eurasian Spoonbill *Platalea leucorodia* and 50 Painted Stork *Mycteria leucocephala* foraging at this site. Very few waders were seen – just two individuals of Marsh Sandpiper *Tringa stagnatilis* and four Common Sandpiper *Actitis hypoleucos*. A single individual of Osprey *Pandion haliaetus* was observed in flight.

## Panje Wetland, Uran

In July 2014, this wetland was full of water, and we observed 24 individuals of Greater Flamingo *Phoenicopterus roseus* and two Intermediate Egret *Ardea intermedia*. During our subsequent visit in August 2014, we observed migratory birds. A group of 50 Greater Flamingos *Phoenicopterus roseus* including 10 sub-adults and about 100 Black-tailed Godwits *Limosa limosa*. A small group of other waders were observed in flight. In September 2014, 44 individuals of Greater Flamingo *Phoenicopterus roseus*, 12 Heuglin's Gull *Larus heuglini*, 15 Eurasian Curlew *Numenius arquata*, 150 Black-wing Stilt *Himantopus himantopus*, 150 Black-tailed Godwit *Limosa limosa* and 40 unidentified waders were seen here. A group of 50 Garganey Ducks *Anas querquedula* were seen resting along the edges of the wetland.



Land filling activity at Belpada cleared the grassland patches

SUJIT NARWADE





SUJIT NARWADE

**Nests of Common Coot were seen in Typha grasses at Belpada**



**Lesser Whistling Teal and Spot-billed Duck were seen with their juveniles at Belpada.**



#### 4.3.2 Forest areas

##### Karnala Bird Sanctuary

On July 23, 2014, between 2.00 pm to 5.00 pm, we walked about 1.5 kilometre on a path from the Forest Department check-post towards Karnala Fort. The weather was cloudy and we encountered three individuals of Common Iora *Agithina tiphia*, five Red-vented Bulbuls *Pycnonotus cafer*, two Puff-throated Babblers *Pellorneum ruficeps* and three Black-naped Blue Monarchs *Hypothymis azurea* foraging in the thickets of *Carissa carandus*; commonly known in Marathi as 'Karvanda', and Liana; the woody climbers. A male Black-headed Oriole *Oriolus xanthornus* and a Purple-rumped Sunbird *Leptocoma zeylonica* were observed in flight. Three Golden-fronted Leafbirds *Chloropsis aurifrons* and a Greater Racket-tailed Drongo *Dicrurus paradiseus* were sighted foraging among the canopies of the large trees.

On September 9, we followed the same path between 10 am and 2.00 pm. We observed one Rufous Treepie *Dendrocitta vagabunda*. 12 individuals of Red-vented Bulbul *Pycnonotus cafer* and four individuals of Red-whiskered Bulbul *Pycnonotus jocosus* foraging in the forest. Three individuals of White-throated Kingfisher *Halcyon smyrnensis* were observed perching on the trees alongside a fast-flowing stream. Seven Spotted Doves *Stigmatopelia chinensis* and two individuals of Greater Racket-tailed Drongo *Dicrurus paradiseus* were seen in flight.

##### Chirner

This site mostly consists plantation and agricultural land, interspersed with the patches of degraded reserved forests. On July 23, 2014, we encountered four individuals of Indian Robin *Saxicoloides fulicatus*, a Common Iora *Agithina tiphia*, eight Red-whiskered Bulbul *Pycnonotus jocosus* and a White-breasted Waterhen *Amaurornis phoenicurus*. Seven individuals of House crow *Corvus splendens* were seen feeding on the carcass of a rat. Four individuals of Indian Pond Heron *Ardeola grayii* and 12 Cattle Egret *Bubulcus ibis* were observed in the paddy fields. Spot-billed Duck *Anas poecilorhyncha* and White-breasted Waterhen *Amaurornis phoenicurus* were observed near a puddle in the forest area.

On August 8, we observed two individuals of Black Drongo *Dicrurus macrocercus*, five House Crows *Corvus splendens*, a Common Kingfisher *Alcedo atthis*, a White-throated Kingfisher *Halcyon smyrnensis*, six Cattle Egrets *Bubulcus ibis*, 13 individuals of Red-whiskered Bulbul *Pycnonotus jocosus*, seven Spotted Dove *Stigmatopelia chinensis* and four Grey-breasted Prinias *Prinia hodgsonii*. We also observed birds of prey including Common Kestrel *Falco tinnunculus* and Brahminy Kite *Haliastur indus* hovering in the skies.

On the September 18, at about 10.30 am we observed 24 individuals of Red-vented Bulbul *Pycnonotus cafer*, 17 individuals of Red-whiskered Bulbul *Pycnonotus jocosus*, eight individuals of Coppersmith Barbet *Megalaima haemacephala*, four Brown-headed Barbet *Megalaima zeylonica* and a male of Common Iora *Agithina tiphia* foraging in the thickets of *Carrissa carandus* (Karvanda). Four individuals of Tawny-bellied Babbler *Turdoides hyperythra* were observed feeding on the fruits of *Ficus* sp. In open field in the forest, we encountered Red-wattled Lapwing *Vanellus indicus*. Black Drongo *Dicrurus macrocercus*, a pair of Indian Robin *Saxicoloides fulicatus* and eight individuals of Little Green Bee-eater *Merops orientalis* were observed feeding on butterflies and other insects.

### Mosare Forest

This site is a patch of deciduous, undisturbed forest on top of a hillock. Agricultural lands surround the base of this hill. The forest is a source of firewood and fodder for the local community.

On the July 26, 2014, we observed two Red-vented Bulbul *Pycnonotus cafer*, six Red-whiskered Bulbul *Pycnonotus jocosus* and a Grey-breasted Prinia *Prinia hodgsonii* in the thickets of *Carrissa carandus* (Karvanda). We observed a Jacobin Cuckoo *Clamator jacobinus*, three individuals of Thick-billed Flowerpecker *Dicaeum erythrorhynchos*, and heard the call of Malabar Whistling Thrush *Myophonus horsfieldi* during the field visit. On the August 5, between 10.00 am and 2.30 pm, we surveyed the 5-kilometre long path in the forests near Mosare village. We recorded two Indian Jungle Crow *Corvus culminatus*, three Black Drongo *Dicrurus macrocercus*, four Indian Robin *Saicoloides fulicatus*, two Common Iora *Aegithina tiphia*, three Thick-billed Flowerpecker *Dicaeum agile*, and four Little Green Bee-eater *Merops orientalis*. The birds of prey such as Shikra *Accipiter badius*, Common Kestrel *Falco tinnunculus* and Crested Serpent Eagle *Spilornis cheela* were seen hovering in the skies. On September 12, we observed seven individuals of House Crow *Corvus splendens*, a flock of seven House Sparrow *Passer domesticus*, a Cinamon Bittern *Ixobrychus cinnamomeus*, two Asian Open-bill Stork *Anastomus oscitans* and a Intermediate Egret *Mesophoyx intermedia*, five individuals of Red-whiskered Bulbul *Pycnonotus jocosus*.



Jungle Babbler with insect catch at chirner





SUJIT NARWADE

About 30 individuals of vigour's sunbird were seen on flowering trees at Mosare in April 2014



SUJIT NARWADE

Asian Paradise Flycatcher was seen usually in Mango orchards at chirner area

## CHAPTER V

## Discussion

The recent developmental activities in Navi Mumbai have resulted in rapid changes in natural habitats with consequences on the movement and distribution of birds. Thus, the knowledge of the movement patterns of species will be important for the protection of birds as well as human life. It is the need of the hour to monitor the area scientifically on a long-term basis with focused study on bird occupancy and movement in the study area.

**Factors resulting in to movement of birds at and around airport areas as mentioned below.**

1. Daily movement of birds and use of different habitats such as roosting (shallow inland wetlands) and foraging (open mudflats of seashore and creeks) and breeding purposes.
2. Seasonal variation in population of birds due to varying water level of wetlands.
3. Hunting: Use of catapults and fish net traps for killing birds usually resulted in to sudden movement of the birds.
4. Disturbance to waterbirds by stray dogs: It was observed many times that stray dogs chase the
5. Spreading of garbage, especially plastic bags, in the natural habitat of the birds.
6. Rapidly changing environment: Conversion of wetlands to plain open areas by land filling for various purposes such as work of Jawaharlal Nehru Port Trust (JNPT) in Uran has led to a change in the distribution of waterbirds. Due to non-availability of suitable water bodies, birds have been restricted to a few areas and these sites are also under pressure of rapid changes, e.g., Funde, Sonari and Belpada land fill. Land filling was observed commonly at wetland areas of Jasai, Sonari-Belpada, and Palm Beach Road, among others, after decrease of water level in summer.

**Measures to be taken to avoid movement of birds in proposed airport area**

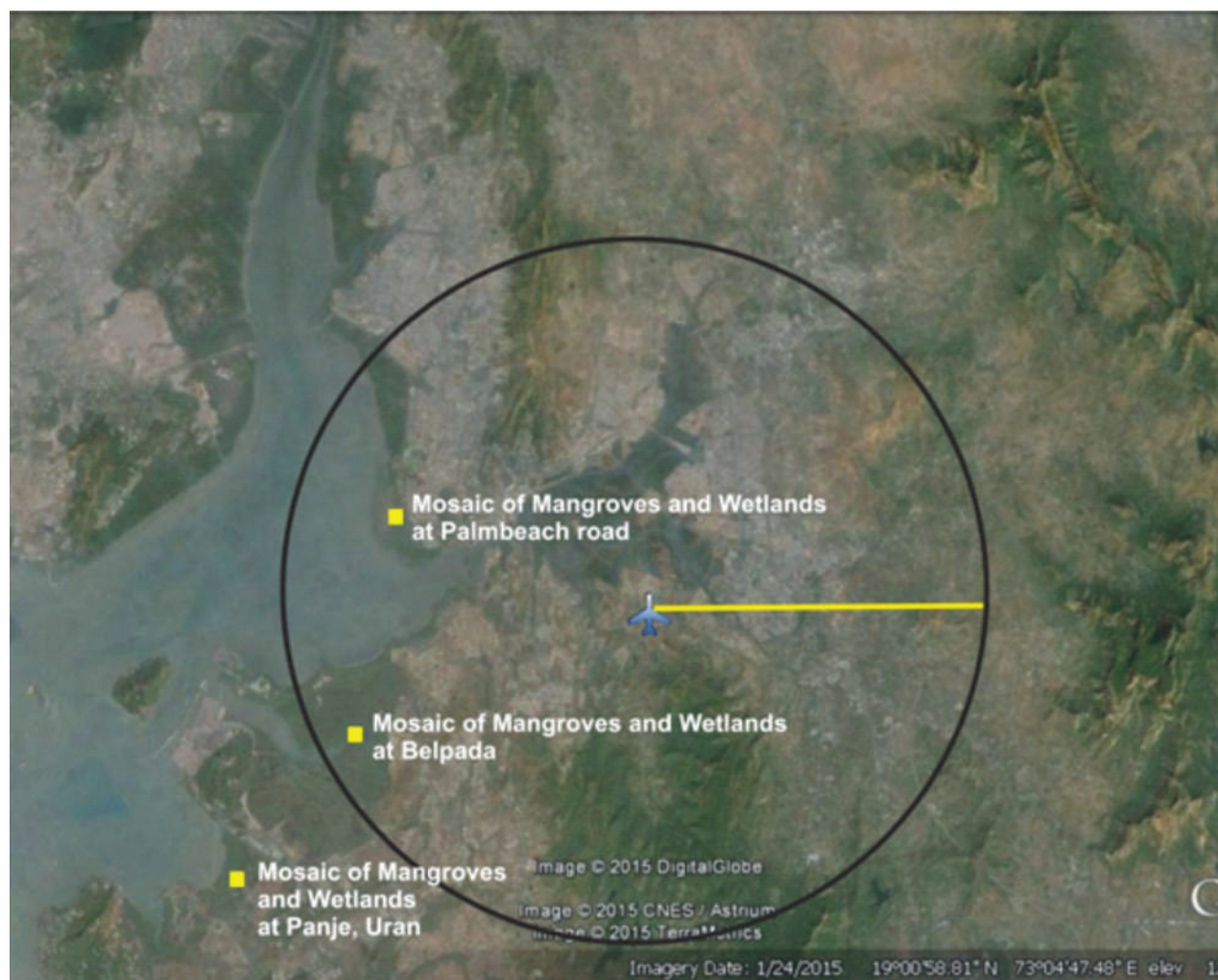
- 1) Monitoring the study area for long term period before construction, during construction as well as during operational periods of NMIA.
- 2) Based on the results and updated information to be compiled during future bird surveys of the BNHS, suitable measures should be applied.
- 3) Habitat management based on the ongoing studies for making the airport area unsuitable for the birds.
- 4) Management of bird roosting areas - some sites should be managed for avoiding movement of birds due to rapidly developing region, especially roosting sites at Sonari-Belpada and Palm Beach Road wetlands.
- 5) Development of a system for proper disposal of garbage, especially plastic waste which attract birds.
- 6) Strict implementation of Wildlife Protection Act to stop hunting and trapping.
- 7) The extent and spread of stone quarries and construction work should be strictly regulated and this work should be minimized in winter.
- 8) Control on stray dogs, especially in winter at the sites used by the waterbirds for congregation. Land filling activities should be regulated strictly, especially at important bird sites such as wetlands of Sonari-Belpada and Palm Beach Road.



**Conclusion: Need for Cumulative Impact Assessment (CIA) study and Conservation offsets to be carried out**

Study should be conducted to assess cumulative impact of various developmental activities proposed in Navi Mumbai Airport Influence Notified Area (NAINA) which will be covering almost 70 villages adjoining to Navi Mumbai. A new Belapur-Seawood-Uran railway line, Mumbai Trans Harbour Link (MTHL) or Sewri-Nhava Sheva Trans Harbour Link, extension of Jawaharlal Nehru Port Trust (JNPT) are also proposed in Navi Mumbai and Uran areas. Therefore, need to study impact of all such developmental activities on birds in Navi Mumbai area is necessary.

The proposed airport is coming in high bird diversity area because of mixture of habitats such as creeks, seashore, paddy fields, forest, inland wetlands, mangroves, etc. Even the runways are proposed to be developed parallel to the creeks flowing adjacent to the airport area. BNHS has concern over human life and we want to avoid bird strikes at proposed NMIA site. Therefore, attempts should be done to make proposed NMIA site and adjoining areas non attractive to the birds. However, there is need of providing conservation offsets by developing agency to establish bird sanctuaries on coast and mangroves away from the influence of air traffic. Instead of creating some protected areas as mangrove park nearby the airport site we suggest concerned authorities to protect potential areas as shown in map 6 as bird sanctuaries outside the airport influence region. This will be helpful for managing the nearby landscape of proposed NMIA site to avoid bird hazard problems in future.



**Map 6: Map showing potential sites for protection of Mangrove and wetland habitats as biodiversity conservation offset**



SUJIT NARWADE

**Birds foraging on garbage dump needs to be monitored**



SUJIT NARWADE

**Land filling activities were seen increased at wetland areas during Summer season**





PARVEEN SHEIKH

Water birds were seen disturbed by stray dogs



SUJIT NARWADE

Children seen using catapult for hunting birds





SUJIT NARWADE

**Habitat destruction due to large number of quarries in Uran area**



SUJIT NARWADE

**Illegal land filling should be banned**





SUJIT NARWADE

**Huge amount of debris get deposited during high tide and get entrapped in Mangroves**



SUJIT NARWADE

**Clearing Mangroves for construction of roads**



## ACKNOWLEDGEMENT

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## Annex I: List of birds observed in mangroves of study area (see abbreviations on page 1)

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M
<b>Family Phalacrocoracidae</b>					
1	Little Cormorant <i>Phalacrocorax niger</i>	W/C	IV	LC	R
2	Great Cormorant <i>Phalacrocorax carbo</i>	W/C	IV	LC	R
3	Indian Shag <i>Phalacrocorax fuscicollis</i>	W/C	IV	LC	R
<b>Family Ardeidae</b>					
4	Eastern Cattle Egret <i>Bubulcus coromandus</i>	W/C	IV	LC	R
5	Intermediate Egret <i>Egretta intermedia</i>	W/C	IV	LC	R
6	Great Egret <i>Egretta alba</i>	W/C	IV	LC	R
7	Little Egret <i>Egretta garzetta</i>	W/C	IV	LC	R
8	Grey Heron <i>Ardea cinerea</i>	W/C	IV	LC	R
9	Indian Pond-heron <i>Ardeola grayii</i>	W/C	IV	LC	R
10	Purple Heron <i>Ardea purpurea</i>	W/C	IV	LC	R
11	Western Reef-heron <i>Egretta gularis</i>	W/C	IV	LC	M
12	Black-crowned Night-heron <i>Nycticorax nycticorax</i>	W	IV	LC	R
13	Striated Heron <i>Butorides striata</i>	W	IV	LC	R
<b>Family Ciconiidae</b>					
14	Painted Stork <i>Mycteria leucocephala</i>	GS	IV	NT	R
<b>Family Threskiornithidae</b>					
15	Black-headed Ibis <i>Threskiornis melanocephalus</i>	W	IV	NT	R
16	Eurasian spoonbill <i>Platalea leucorodia</i>	W	IV	LC	R
<b>Family Accipitridae</b>					
17	Black Kite <i>Milvus migrans migrans/govinda</i>	All	I	LC	R
18	Brahminy Kite <i>Haliastur indus</i>	All	I	LC	R
19	Black-eared Kite <i>Milvus [migrans] lineatus</i>	All	I	LC	M
20	Western Marsh Harrier <i>Circus aeruginosus</i>	All	I	LC	M
<b>Family Pandionidae</b>					
21	Western Osprey <i>Pandion haliaetus</i>	W/C	I	LC	R
<b>Family Rallidae</b>					
22	Slaty-breasted Rail <i>Gallirallus striatus</i>	W/C	IV	LC	R
<b>Family Laridae</b>					
23	Gull-billed Tern <i>Gelochelidon nilotica</i>	W/C	IV	LC	M
24	Whiskered Tern <i>Chlidonias hybridus</i>	W/C	IV	LC	M
<b>Family Cuculidae</b>					
25	Asian Koel <i>Eudynamys scolopaceus</i>	All	IV	LC	R
26	Greater Coucal (Southern Coucal) <i>Centropus sinensis</i>	All	IV	LC	R

**Annex I: List of birds observed in mangroves of study area (see abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M
27	Jacobin Cuckoo <i>Clamator jacobinus</i>	All	IV	LC	M
	<b>Family Alcedinidae</b>				
28	Lesser Pied Kingfisher <i>Ceryle rudis</i>	W/C	IV	LC	R
29	White-throated Kingfisher <i>Halcyon smyrnensis</i>	W/C	IV	LC	R
30	Common Kingfisher <i>Alcedo atthis</i>	W/C	IV	LC	R
	<b>Family Pycnonotidae</b>				
31	Red-vented Bulbul <i>Pycnonotus cafer</i>	M	IV	LC	R
32	White-eared Bulbul <i>Pycnonotus leucotis</i>	M	IV	LC	R
	<b>Family Laniidae</b>				
33	Bay-backed Shrike <i>Lanius vittatus</i>	M/GS	IV	LC	R
34	'Rufous-backed' Long-tailed Shrike <i>MLanius schach erythronotus group</i>	M/GS	IV	LC	R
	<b>Family Muscicapidae</b>				
35	Yellow-eyed Babbler <i>Chrysomma sinense</i>	M/GS	IV	LC	R
36	Oriental Magpie-robin <i>Copsychus saularis</i>	M/GS	IV	LC	R
37	Indian Black Robin <i>Saxicoloides fulicatus</i>	M/GS	IV	LC	R
38	Plain Prinia <i>Prinia inornata</i>	M/GS	IV	LC	R
39	Ashy Prinia <i>Prinia socialis</i>	M/GS	IV	LC	R
40	Grey-breasted Prinia <i>Prinia hodgsonii</i>	M/GS	IV	LC	R
41	Indian Reed-warbler <i>Acrocephalus [stentoreus] brunescens</i>	M	IV	LC	M
42	Common Tailorbird <i>Orthotomus sutorius</i>	M/GS	IV	LC	R
43	Lesser Whitethroat <i>Sylvia curruca</i>	M/GS	IV	LC	M
44	White-browed Fantail <i>Rhipidura albicollis</i>	M/GS	IV	LC	M
	<b>Family Nectariniidae</b>				
45	Purple Sunbird <i>Cinnyris asiatica</i>	All	IV	LC	R
46	Purple-rumped Sunbird <i>Leptocoma zeylonica</i>	All	IV	LC	R
	<b>Family Emberizidae</b>				
47	Red-headed Bunting <i>Emberiza bruniceps</i>	GS	IV	LC	M
48	Black-headed Bunting <i>Emberiza melanocephala</i>	GS	IV	LC	M
	<b>Family Estrildidae</b>				
49	Indian Silverbill <i>Euodice malabarica</i>	M/GS	IV	LC	R
50	Red Avadavat <i>Amandava amandava</i>	M/GS	IV	LC	R
51	Tricoloured Munia <i>Lonchura malacca</i>	M/GS	IV	LC	R
52	Scaly-breasted Munia <i>Lonchura punctulata</i>	M/GS	IV	LC	R



**Annex I: List of birds observed in mangroves of study area (see abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M
<b>Family Passeridae</b>					
53	House Sparrow <i>Passer domesticus</i>	M/GS	IV	LC	R
54	Baya Weaver <i>Ploceus philippinus</i>	M/GS	IV	LC	R
55	Black-breasted Weaver <i>Ploceus benghalensis</i>	M/GS	IV	LC	R
<b>Family Sturnidae</b>					
56	Rosy Starling <i>Sturnus roseus</i>	M	IV	LC	M
57	Brahminy Starling <i>Temenuchus pagodarum</i>	M	IV	LC	R
58	Asian Pied Starling <i>Gracupica contra</i>	M	IV	LC	R
59	Common Myna <i>Acridotheres tristis</i>	M	IV	LC	R
60	Jungle Myna <i>Acridotheres fuscus</i>	M	IV	LC	R
<b>Family Dicruridae</b>					
61	Black Drongo <i>Dicrurus macrocercus</i>	All	IV	LC	R
<b>Family Corvidae</b>					
62	House Crow <i>Corvus splendens</i>	All	V	LC	R
63	Indian Jungle Crow <i>Corvus [macrorhynchos] culminatus</i>	All	IV	LC	R

**Annex II: List of birds observed at NMIA site in study area (see abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M
<b>Family Phalacrocoracidae</b>					
1	Little Cormorant <i>Phalacrocorax niger</i>	W/C	IV	LC	R
2	Great Cormorant <i>Phalacrocorax carbo</i>	W/C	IV	LC	R
3	Indian Shag <i>Phalacrocorax fuscicollis</i>	W/C	IV	LC	R
<b>Family Ardeidae</b>					
		W/C			
4	Eastern Cattle Egret <i>Bubulcus coromandus</i>	W/C	IV	LC	R
5	Intermediate Egret <i>Egretta intermedia</i>	W/C	IV	LC	R
6	Great Egret <i>Egretta alba</i>	W/C	IV	LC	R
7	Little Egret <i>Egretta garzetta</i>	W/C	IV	LC	R
8	Grey Heron <i>Ardea cinerea</i>	W/C	IV	LC	R
9	Indian Pond-heron <i>Ardeola grayii</i>	W/C	IV	LC	R
10	Purple Heron <i>Ardea purpurea</i>	W/C	IV	LC	R
11	Western Reef-heron <i>Egretta gularis</i>	W/C	IV	LC	M
12	Black-crowned Night-heron <i>Nycticorax nycticorax</i>	W	IV	LC	R
13	Striated Heron <i>Butorides striata</i>	W	IV	LC	R
<b>Family Ciconiidae</b>					
14	Painted Stork <i>Mycteria leucocephala</i>	GS	IV	NT	R
15	Woolly-necked Stork <i>Ciconia episcopus</i>	GS	IV	LC	R
<b>Family Threskiornithidae</b>					
16	Black-headed Ibis <i>Threskiornis melanocephalus</i>	W	IV	NT	R
<b>Family Anatidae</b>					
17	Northern Pintail <i>Anas acuta</i>	C	IV	LC	M
18	Common Teal <i>Anas crecca</i>	C	IV	LC	M
19	Indian Spot-billed Duck <i>Anas poecilorhyncha</i>	C	IV	LC	R
20	Garganey <i>Anas querquedula</i>	C	IV	LC	M
21	Northern Shoveller <i>Anas clypeata</i>	C	IV	LC	M
<b>Family Accipitridae</b>					
22	Black-winged Kite <i>Elanus caeruleus</i>	All	I	LC	R
23	Black Kite <i>Milvus migrans migrans/govinda</i>	All	I	LC	R
24	Brahminy Kite <i>Haliastur indus</i>	All	I	LC	R
25	Black-eared Kite <i>Milvus [migrans] lineatus</i>	All	I	LC	M
26	Shikra <i>Accipiter badius</i>	All	I	LC	R
27	Western Marsh Harrier <i>Circus aeruginosus</i>	All	I	LC	M
28	Booted Eagle <i>Hieraaetus pennatus</i>	All	I	LC	M



**Annex II: List of birds observed at NMIA site in study area (see abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M
29	Greater Spotted Eagle <i>Aquila clanga</i>	All	I	LC	M
30	Indian Spotted Eagle <i>Aquila pomarina</i>	All	I	VU	R
	<b>Family Falconidae</b>				
31	Common Kestrel <i>Falco tinnunculus</i>	GS	IV	LC	R
32	<b>Family Pandionidae</b>				
33	Western Osprey <i>Pandion haliaetus</i>	W/C	I	LC	R
	<b>Family Phasianidae</b>				
34	Rain Quail <i>Coturnix coromandelica</i>	GS	-	LC	R
35	Jungle Bush-quail <i>Perdica asiatica</i>	GS	-	LC	R
	<b>Family Turnicidae</b>				
36	Barred Buttonquail <i>Turnix suscitator</i>	GS	-	LC	R
37	Yellow-legged buttonquail <i>Turnix tanki</i>	GS	-	LC	R
	<b>Family Rallidae</b>				
38	Slaty-breasted Rail <i>Gallirallus striatus</i>	W/C	IV	LC	R
39	Ruddy-breasted Crake <i>Porzana fusca</i>	W/C	IV	LC	R
40	Brown Crake <i>Porzana akool</i>	W/C	IV	LC	R
	<b>Family Charadriidae</b>				
41	Red-wattled Lapwing <i>Vanellus Indicus</i>	GS	IV	LC	R
42	Lesser Sand Plover <i>Charadrius mongolus</i>	W/C	IV	LC	M
43	Little Ringed Plover <i>Charadrius dubius</i>	W/C	IV	LC	R
44	Pacific Golden Plover <i>Pluvialis fulva</i>	W/C	IV	LC	M
45	Kentish Plover <i>Charadrius alexandrinus</i>	W/C	IV	LC	M
	<b>Family Scolopacidae</b>				
46	Common Snipe <i>Gallinago gallinago</i>	W	IV	LC	R
47	Common Redshank <i>Tringa totanus</i>	W/C	IV	LC	M
48	Wood Sandpiper <i>Tringa glareola</i>	W/C	IV	LC	M
49	Common Sandpiper <i>Tringa hypoleucos</i>	W/C	IV	LC	R
50	Common Greenshank <i>Tringa nebularia</i>	W/C	IV	LC	M
51	Green Sandpiper <i>Tringa ochropus</i>	W/C	IV	LC	M
52	Marsh Sandpiper <i>Tringa stagnatilis</i>	W/C	IV	LC	M
53	'Western' Black-tailed Godwit <i>Limosa limosa</i>	W/C	IV	LC	M
54	Eurasian Curlew <i>Numenius arquata</i>	W/C	IV	LC	M
55	Temminck's Stint <i>Calidris temminckii</i>	W/C	IV	LC	M
56	Little Stint <i>Calidris minuta</i>	W/C	IV	LC	M

**Annex II: List of birds observed at NMIA site in study area (see abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M
57	Curlew Sandpiper <i>Calidris ferruginea</i>	W/C	IV	LC	M
58	Broad-billed Sandpiper <i>Limicola falcinellus</i>	W/C	IV	LC	M
59	Ruff <i>Philomachus pugnax</i>	W/C	IV	LC	M
60	Dunlin <i>Calidris alpina</i>	W/C	IV	LC	M
61	Whimbrel <i>Numenius phaeopus</i>	W/C	IV	LC	
<b>Family Recurvirostridae</b>					
62	Black-winged Stilt <i>Himantopus himantopus</i>	W/C	IV	LC	R
<b>Family Laridae</b>					
63	Gull-billed Tern <i>Gelochelidon nilotica</i>	W/C	IV	LC	M
64	Whiskered Tern <i>Chlidonias hybridus</i>	W/C	IV	LC	M
65	River Tern <i>Sterna aurantia</i>	W/C	IV	LC	M
66	Brown-headed Gull <i>Larus brunnicephalus</i>	W/C	IV	LC	M
67	Common Black-headed Gull <i>Larus ridibundus</i>	W/C	IV	LC	M
<b>Family Columbidae</b>					
68	Rock Pigeon <i>Columba livia</i>	All		LC	R
69	Laughing Dove <i>Streptopelia senegalensis</i>	All	IV	LC	R
70	Eurasian Collared-dove <i>Streptopelia decaocto</i>	All	IV	LC	R
71	Spotted Dove <i>Streptopelia chinensis</i>	All	IV	LC	R
<b>Family Psittacidae</b>					
72	Rose-ringed Parakeet <i>Psittacula krameri</i>	All	IV	LC	R
<b>Family Cuculidae</b>					
73	Asian Koel <i>Eudynamys scolopaceus</i>	All	IV	LC	R
74	Greater Coucal (Southern Coucal) <i>Centropus sinensis</i>	All	IV	LC	R
75	Common Hawk-cuckoo <i>Hierococcyx varius</i>	All	IV	LC	R
76	Jacobin Cuckoo <i>Clamator jacobinus</i>	All	IV	LC	M
77	Indian Cuckoo <i>Cuculus micropterus</i>	All	IV	LC	R
<b>Family Strigidae</b>					
78	Spotted Owlet <i>Athene brama</i>	GS	IV	LC	R
<b>Family Apodidae</b>					
79	Little Swift <i>Apus affinis</i>	All		LC	R
80	Asian Palm-swift <i>Cypsiurus balasiensis</i>	All		LC	R
<b>Family Alcedinidae</b>					
81	Lesser Pied Kingfisher <i>Ceryle rudis</i>	W/C	IV	LC	R
82	White-throated Kingfisher <i>Halcyon smyrnensis</i>	W/C	IV	LC	R
83	Common Kingfisher <i>Alcedo atthis</i>	W/C	IV	LC	R



**Annex II: List of birds observed at NMIA site in study area (see abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M
<b>Family Meropidae</b>					
84	Little Green Bee-eater <i>Merops orientalis</i>	All		LC	R
<b>Family Coraciidae</b>					
85	Indian Roller <i>Coracias benghalensis</i>	All	IV	LC	R
<b>Family Upupidae</b>					
86	Common Hoopoe <i>Upupa epops</i>	GS		LC	M
<b>Family Capitonidae</b>					
87	Coppersmith Barbet <i>Megalaima haemacephala</i>	GS	IV	LC	R
<b>Family Picidae</b>					
88	Eurasian Wryneck <i>Jynx torquilla</i>	GS	IV	LC	R
<b>Family Alaudidae</b>					
89	Ashy-crowned Finch-lark <i>Eremopterix griseus</i>	GS	IV	LC	R
90	Rufous-tailed Lark <i>Ammomanes phoenicura</i>	GS	IV	LC	R
91	Malabar Lark <i>Galerida malabarica</i>	GS	IV	LC	R
<b>Family Motacillidae</b>					
92	Citrine Wagtail <i>Motacilla citreola</i>	W	IV	LC	M
93	Yellow Wagtail <i>Motacilla flava</i>	W	IV	LC	M
94	Grey Wagtail <i>Motacilla cinerea</i>	W	IV	LC	M
95	White Wagtail <i>Motacilla alba</i>	W	IV	LC	M
96	White-browed Wagtail <i>Motacilla maderaspatensis</i>	W	IV	LC	R
97	Tree Pipit <i>Anthus trivialis</i>	GS	IV	LC	M
98	Paddyfield Pipit <i>Anthus rufulus</i>	GS	IV	LC	R
<b>Family Hirundinidae</b>					
99	Wire-tailed Swallow <i>Hirundo smithii</i>	All	IV	LC	R
100	Barn Swallow <i>Hirundo rustica</i>	All	IV	LC	R
<b>Family Campephagidae</b>					
101	Common Woodshrike <i>Tephrodornis pondicerianus</i>	GS	IV	LC	R
102	Large Cuckoo-shrike <i>Coracina macei</i>	GS	IV	LC	R
103	<b>Family Irenidae</b>				
104	Common Iora <i>Aegithina tiphia</i>		IV	LC	R
<b>Family Pycnonotidae</b>					
105	Red-vented Bulbul <i>Pycnonotus cafer</i>	M	IV	LC	R
106	White-eared Bulbul <i>Pycnonotus leucotis</i>	M	IV	LC	R

**Annex II: List of birds observed at NMIA site in study area (see abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M
<b>Family Laniidae</b>					
107	Bay-backed Shrike <i>Lanius vittatus</i>	M/GS	IV	LC	R
108	'Rufous-backed' Long-tailed Shrike <i>Lanius schach erythronotus</i>	M/GS	IV	LC	R
109	Southern Grey Shrike <i>Lanius meridionalis</i>	M/GS	IV	LC	R
<b>Family Muscicapidae</b>					
110	Yellow-eyed Babbler <i>Chrysomma sinense</i>	M/GS	IV	LC	R
111	Black Redstart <i>Phoenicurus ochruros</i>	M/GS	IV	LC	M
112	Oriental Magpie-robin <i>Copsychus saularis</i>	M/GS	IV	LC	R
113	Common Stonechat <i>Saxicola torquatus</i>	GS	IV	LC	M
114	Pied Bushchat <i>Saxicola caprata</i>	GS	IV	LC	R
115	Isabelline Wheatear <i>Oenanthe isabellina</i>	GS	IV	LC	M
116	Indian Black Robin <i>Saxicoloides fulicatus</i>	M/GS	IV	LC	R
117	Bluethroat <i>Luscinia svecica</i>	M/GS	IV	LC	M
118	Zitting Cisticola <i>Cisticola juncidis</i>	GS	IV	LC	R
119	Plain Prinia <i>Prinia inornata</i>	M/GS	IV	LC	R
120	Ashy Prinia <i>Prinia socialis</i>	M/GS	IV	LC	R
121	Grey-breasted Prinia <i>Prinia hodgsonii</i>	M/GS	IV	LC	R
122	Indian Reed-warbler <i>Acrocephalus [stentoreus] brunescens</i>	M	IV	LC	M
123	Common Tailorbird <i>Orthotomus sutorius</i>	M/GS	IV	LC	R
124	Lesser Whitethroat <i>Sylvia curruca</i>	M/GS	IV	LC	M
125	White-browed Fantail <i>Rhipidura albicollis</i>	M/GS	IV	LC	M
<b>Family Dicaeidae</b>					
126	Thick-billed Flowerpecker <i>Dicaeum agile</i>	GS	IV	LC	R
127	Pale-billed Flowerpecker <i>Dicaeum erythrorhynchos</i>	GS	IV	LC	R
<b>Family Nectariniidae</b>					
128	Purple Sunbird <i>Cinnyris asiatica</i>	All	IV	LC	R
129	Purple-rumped Sunbird <i>Leptocoma zeylonica</i>	All	IV	LC	R
<b>Family Emberizidae</b>					
130	Red-headed Bunting <i>Emberiza bruniceps</i>	GS	IV	LC	M
131	Black-headed Bunting <i>Emberiza melanocephala</i>	GS	IV	LC	M
<b>Family Estrildidae</b>					
132	Indian Silverbill <i>Euodice malabarica</i>	M/GS	IV	LC	R
133	Red Avadavat <i>Amandava amandava</i>	M/GS	IV	LC	R
134	Tricoloured Munia <i>Lonchura malacca</i>	M/GS	IV	LC	R



**Annex II: List of birds observed at NMIA site in study area (see abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M
<b>Family Passeridae</b>					
135	Scaly-breasted Munia <i>Lonchura punctulata</i>	M/GS	IV	LC	R
136	House Sparrow <i>Passer domesticus</i>	M/GS	IV	LC	R
137	Baya Weaver <i>Ploceus philippinus</i>	M/GS	IV	LC	R
138	Black-breasted Weaver <i>Ploceus benghalensis</i>	M/GS	IV	LC	R
139	Yellow-throated Sparrow <i>Petronia xanthocollis</i>	M/GS	IV	LC	R
<b>Family Sturnidae</b>					
140	Rosy Starling <i>Sturnus roseus</i>	M	IV	LC	M
141	Brahminy Starling <i>Temenuchus pagodarum</i>	M	IV	LC	R
142	Asian Pied Starling <i>Gracupica contra</i>	M	IV	LC	R
143	Common Myna <i>Acridotheres tristis</i>	M	IV	LC	R
144	Jungle Myna <i>Acridotheres fuscus</i>	M	IV	LC	R
<b>Family Oriolidae</b>					
145	Indian Golden Oriole <i>Oriolus kundoo</i>	All	IV	LC	R
<b>Family Dicruridae</b>					
146	Black Drongo <i>Dicrurus macrocercus</i>	All	IV	LC	R
<b>Family Corvidae</b>					
147	House Crow <i>Corvus splendens</i>	All	V	LC	R
148	Indian Jungle Crow <i>Corvus [macrorhynchos] culminatus</i>	All	IV	LC	R

**Annex III: List of birds observed in 10 km radius area of NMIA site (see Abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
<b>Family Podicipedidae</b>						
1	Little Grebe <i>Tachybaptus ruficollis</i>	W	IV	LC	R	Dastan Phata, DPS Lake
<b>Family Phalacrocoracidae</b>						
2	Little Cormorant <i>Phalacrocorax niger</i>	W	IV	LC	R	All wetlands
3	Great Cormorant <i>Phalacrocorax carbo</i>	W	IV	LC	R	NRI Wetland
4	Indian Shag <i>Phalacrocorax fuscicollis</i>	W	IV	LC	R	All wetlands
<b>Family Ardeidae</b>						
5	Eastern Cattle Egret <i>Bubulcus coromandus</i>	W/P	IV	LC	R	All wetlands
6	Intermediate Egret <i>Egretta intermedia</i>	W/P	IV	LC	R	All wetlands
7	Great Egret <i>Egretta alba</i>	W	IV	LC	R	All wetlands
8	Little Egret <i>Egretta garzetta</i>	W/P/C	IV	LC	R	All wetlands
9	Grey Heron <i>Ardea cinerea</i>	W/C	IV	LC	R	All wetlands
10	Indian Pond-heron <i>Ardeola grayii</i>	W	IV	LC	R	All wetlands
11	Purple Heron <i>Ardea purpurea</i>	W/C	IV	LC	R	All wetlands
12	Western Reef-heron <i>Egretta gularis</i>	W/MD	IV	LC	M	Dastan Phata, Sonari-Belpada
13	Black-crowned Night-heron <i>Nycticorax nycticorax</i>	W	IV	LC	R	Kharghar Creek, NRI Wetland, Panvel Creek.
14	Striated Heron <i>Butorides striata</i>	W	IV	LC	R	Panje
15	Black Bittern <i>Dupetor flavicollis</i>	W	IV	LC	R	NRI Wetland
16	Chestnut Bittern <i>Ixobrychus cinnamomeus</i>	W	IV	LC	R	Mosare, Sonari-Belpada
<b>Family Ciconiidae</b>						
17	Painted Stork <i>Mycteria leucocephala</i>	W	IV	NT	R	Sonari-Belpada, NRI Wetland
18	Asian Openbill <i>Anastomus oscitans</i>	W	IV	LC	R	Dastan Phata
19	Woolly-necked Stork <i>Ciconia episcopus</i>	W	IV	LC	R	Dastan Phata, Mosare
20	Black Stork <i>Ciconia nigra</i>	W	IV	LC	M	Ransai dam
<b>Family Threskiornithidae</b>						
21	Black-headed Ibis <i>Threskiornis melanocephalus</i>	W/C	IV	NT	R	All wetlands and mangroves
22	Indian Black Ibis <i>Pseudibis papillosa</i>	W	IV	LC	R	Morbe
23	Eurasian Spoonbill <i>Platalea leucorodia</i>	W	I	LC	R	Jasai, Sonari-Belpada
24	Glossy Ibis <i>Plegadis falcinellus</i>	W	IV	LC	M	Sonari-Belpada
<b>Family Phoenicopteridae</b>						
25	Greater Flamingo <i>Phoenicopterus roseus</i>	W	I	LC	M	Sonari-Belpada, NRI Wetland
26	Lesser Flamingo <i>Phoeniconaias minor</i>	W	I	NT	M	NRI Wetland, Panje, TSC Wetland



## Annex III: List of birds observed in 10 km radius area of NMIA site (see Abbreviations on page 1)

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
<b>Family Anatidae</b>						
27	Greylag Goose <i>Anser anser</i>	W	IV	LC	M	Sonari-Belpada
28	Ruddy Shelduck <i>Tadorna ferruginea</i>	W	IV	LC	M	Sonari-Belpada, Panje
29	Northern Pintail <i>Anas acuta</i>	W	IV	LC	M	Sonari-Belpada
30	Common Teal <i>Anas crecca</i>	W	IV	LC	M	Sonari-Belpada
31	Indian Spot-billed Duck <i>Anas poecilorhyncha</i>	W/C	IV	LC	R	All wetlands
32	Mallard <i>Anas platyrhynchos</i>	W	IV	LC	M	NRI Wetland
33	Garganey <i>Anas querquedula</i>	W	IV	LC	M	Sonari-Belpada
34	Northern Shoveller <i>Anas clypeata</i>	W/C	IV	LC	M	Kharghar Creek
35	Comb Duck <i>Sarkidiornis melanotos</i>	W	IV	LC	R	Dastan Phata
36	Lesser Whistling-duck <i>Dendrocygna javanica</i>	W	IV	LC	R	Dastan Phata, Sonari-Belpada, NRI Wetland
37	Cotton Teal <i>Nettapus coromandelianus</i>	W	IV	LC	R	Dastan Phata
38	Gadwall <i>Anas strepera</i>	W	IV	LC	M	Sonari-Belpada
39	Eurasian Wigeon <i>Anas penelope</i>	W	IV	LC	M	Sonari-Belpada
<b>Family Accipitridae</b>						
40	Black-winged Kite <i>Elanus caeruleus</i>	All	I	LC	R	All wetlands
41	Black Kite <i>Milvus migrans migrans/govinda</i>	All	I	LC	R	All wetlands
42	Brahminy Kite <i>Haliastur indus</i>	W/P	I	LC	R	Sonari-Belpada, Dastan Phata
43	Black-eared Kite <i>Milvus [migrans] lineatus</i>	W	I	LC	M	Sonari-Belpada
44	Shikra <i>Accipiter badius</i>	All	I	LC	R	
45	White-eyed Buzzard <i>Butastur teesa</i>	F	I	LC	R	Jasai
46	Oriental Honey-buzzard <i>Pernis ptilorhynchus</i>	F	I	LC	R	Mosare
47	Common Buzzard <i>Buteo buteo</i>	F	I	LC	R	Ransai, Chirner
48	Long-legged Buzzard <i>Buteo rufinus</i>	F	I	LC	R	Mosare
49	Western Marsh Harrier <i>Circus aeruginosus</i>	W	I	LC	M	All wetlands
50	Palid Harrier <i>Circus macrourus</i>	W	I	LC	M	Panje
51	Montagu's Harrier <i>Circus pygargus</i>	W	I	LC	M	Panje
52	Crested Serpent-eagle <i>Spilornis cheela</i>	F	I	LC	R	Ransai, Mosare
53	Changeable Hawk-eagle <i>Nisaetus cirrhatus</i>	F	I	LC	R	Ransai
54	Short-toed Eagle <i>Circaetus allicus</i>	GS	I	LC	R	Chirner
55	Booted Eagle <i>Hieraaetus pennatus</i>	F	I	LC	M	Mosare

**Annex III: List of birds observed in 10 km radius area of NMIA site (see Abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
56	Greater Spotted Eagle <i>Aquila clanga</i>	F	I	LC	M	Sonari-Belpada, Mosare
57	Indian Spotted Eagle <i>Aquila pomarina</i>	W	I	VU	R	Sonari-Belpada
58	White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	W	I		R	Panje
59	Black Eagle <i>Ictinaetus malayensis</i>	F	I		R	Karnala Bird Sanctuary
<b>Family Falconidae</b>						
60	Common Kestrel <i>Falco tinnunculus</i>	GS	IV	LC	R	Chirner, Sonari-Belpada
61	Peregrine Falcon (Shaheen) <i>Falco peregrinus perigrinator</i>	W	IV	LC	R	Panje
<b>Family Pandionidae</b>						
62	Western Osprey <i>Pandion haliaetus</i>	W/C	I	LC	R	Kharghar Creek, Sonari-Belpada
<b>Family Phasianidae</b>						
64	Rain Quail <i>Coturnix coromandelica</i>	P	-	LC	R	Chirner
65	Red Spurfowl <i>Galloperdix spadicea</i>	F	-	LC	R	Kharghar hills
66	Jungle Bush-quail <i>Perdica asiatica</i>	F	-	LC	R	Ransai, Chirner Road
67	Indian Peafowl <i>Pavo cristatus</i>	F	I	LC	R	Mosare
68	Painted Francolin <i>Francolinus pictus</i>	GS	-	LC	R	Taloja
69	Grey Francolin <i>Francolinus pondicerianus</i>	GS	-	LC	R	Taloja
<b>Family Turnicidae</b>						
70	Barred Buttonquail <i>Turnix suscitator</i>	P	-	LC	R	Chirner
71	Yellow-legged buttonquail <i>Turnix tanki</i>	P	-	LC	R	Chirner
<b>Family Gruidae</b>						
72	Demoiselle Crane <i>Grus virgo</i>	W		LC	M	Sonari-Belpada
<b>Family Rallidae</b>						
73	White-breasted Waterhen <i>Amaurornis phoenicurus</i>	W/C	IV	LC	R	Sonari-Belpada
74	Purple Swampphen <i>Porphyrio porphyrio</i>	W	IV	LC	R	Sonari-Belpada
75	Watercock <i>Gallicrex cinerea</i>	W	IV	LC	R	Sonari-Belpada
76	Common Moorhen <i>Gallinula chloropus</i>	W	IV	LC	R	Sonari-Belpada
77	Eurasian Coot <i>Fulica atra</i>	W	IV	LC	R	Sonari-Belpada
78	Slaty-breasted Rail <i>Gallirallus striatus</i>	W/C	IV	LC	R	Kharghar Creek, Panvel Creek
79	Ruddy-breasted Crake <i>Porzana fusca</i>	W/C	IV	LC	R	Kharghar Creek, Panvel Creek
80	Brown Crake <i>Porzana akool</i>	W/C	IV	LC	R	Chirner, Panje
<b>Family Jacanidae</b>						
81	Bronze-winged Jacana <i>Metopidius indicus</i>	W	IV	LC	R	Sonari-Belpada



## Annex III: List of birds observed in study area (see Abbreviations at the end of Annex-III)

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
<b>Family Rostratulidae</b>						
82	Pheasant-tailed Jacana <i>Hydrophasianus chirurgus</i>	W	IV	LC	R	Sonari-Belpada
83	Greater Painted Snipe <i>Rostratula benghalensis</i>	W	IV	LC	R	Sonari-Belpada
<b>Family Charadriidae</b>						
84	Red-wattled Lapwing <i>Vanellus Indicus</i>	ALL	IV	LC	R	All wetlands
85	Lesser Sand Plover <i>Charadrius mongolus</i>	W/MD	IV	LC	M	All wetlands
86	Greater Sand Plover <i>Charadrius leschenaulti</i>	W/MD	IV	LC	M	NRI Wetland
87	Little Ringed Plover <i>Charadrius dubius</i>	W/MD	IV	LC	R	All wetlands
88	Common Ringed Plover <i>Charadrius hiaticula</i>	W/MD	IV	LC	M	Panje
89	Pacific Golden Plover <i>Pluvialis fulva</i>	W/MD	IV	LC	M	Panvel Creek, TSC Wetland
90	Kentish Plover <i>Charadrius alexandrinus</i>	W/MD	IV	LC	M	All wetlands
91	Grey Plover <i>Pluvialis squatarola</i>	W/MD	IV	LC	M	NRI Wetland, TSC Wetland
<b>Family Scolopacidae</b>						
92	Common Snipe <i>Gallinago gallinago</i>	W	IV	LC	R	Sonari-Belpada, Dastan Phata
93	Common Redshank <i>Tringa totanus</i>	W/MC	IV	LC	M	All wetlands (congregation at Kharghar Creek)
94	Wood Sandpiper <i>Tringa glareola</i>	W/MC	IV	LC	M	All wetlands
95	Common Sandpiper <i>Tringa hypoleucos</i>	W/MC	IV	LC	R	All wetlands
96	Common Greenshank <i>Tringa nebularia</i>	W/RS	IV	LC	M	Seashore of Palm Beach Road, Sonari-Belpada, NRI Lake, TS Chanakya.
97	Terek Sandpiper <i>Xenus cinereus</i>	W/MC	IV	LC	M	Kharghar Creek, Kopar
98	Green Sandpiper <i>Tringa ochropus</i>	W/MC	IV	LC	M	Sonari-Belpada
99	Marsh Sandpiper <i>Tringa stagnatilis</i>	W	IV	LC	M	All wetlands (more at Belpada)
100	'Western' Black-tailed Godwit <i>Limosa limosa</i>	W	IV	LC	M	All wetlands
101	Eurasian Curlew <i>Numenius arquata</i>	W	IV	LC	M	NRI Wetland, Panje
102	Ruddy Turnstone <i>Arenaria interpres</i>	RS	IV	LC	M	TSC Wetland
103	Temminck's Stint <i>Calidris temminckii</i>	W	IV	LC	M	All wetlands
104	Little Stint <i>Calidris minuta</i>	W	IV	LC	M	All wetlands
105	Curlew Sandpiper <i>Calidris ferruginea</i>	W	IV	LC	M	Sonari-Belpada, Dastan Phata, NRI Lake, TSC Wetland
106	Broad-billed Sandpiper <i>Limicola falcinellus</i>	W	IV	LC	M	Belpada, NRI Lake, TSC Wetland

## Annex III: List of birds observed in 10 km radius area of NMIA site (see Abbreviations on page 1)

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
107	Ruff <i>Philomachus pugnax</i>	W	IV	LC	M	Sonari-Belpada, Dastan Phata, Panje
108	Dunlin <i>Calidris alpina</i>	W	IV	LC	M	Panje
109	Whimbrel <i>Numenius phaeopus</i>	W	IV	LC		Sonari-Belpada
	<b>Family Recurvirostridae</b>					
110	Black-winged Stilt <i>Himantopus himantopus</i>	W	IV	LC	R	All wetlands
111	Pied Avocet <i>Recurvirostra avosetta</i>	W	IV	LC	M	Jasai, NRI Wetland
	<b>Family Phalaropidae</b>					
112	Red-necked Phalarope <i>Phalaropus lobatus</i>	W	IV	LC	M	Uran
	<b>Family Laridae</b>					
113	Gull-billed Tern <i>Gelochelidon nilotica</i>	W	IV	LC	M	All wetlands
114	Caspian Tern <i>Sterna caspia</i>	W/C	IV	LC	M	NRI Wetland, TSC Wetland, Panje
115	Saunders' Tern <i>Sterna saundersi</i>	W/C	IV	LC	M	NRI Wetland, TSC Wetland
116	Whiskered Tern <i>Chlidonias hybridus</i>	W/C	IV	LC	M	NRI Wetland, TSC Wetland, Panje
117	River Tern <i>Sterna aurantia</i>	W/C	IV	LC	M	Sonari-Belpada, NRI Wetland, TSC Wetland, Panje
118	White-cheeked Tern <i>Sterna repressa</i>	W	IV	LC	M	Jasai
119	Slender-billed Gull <i>Larus genei</i>	W	IV	LC	M	NRI Wetland, TSC Wetland
120	Brown-headed Gull <i>Larus brunnicephalus</i>	W	IV	LC	M	All wetlands
121	Common Black-headed Gull <i>Larus ridibundus</i>	W	IV	LC	M	All wetlands
122	Heuglin's Gull <i>Larus fuscus heuglini</i>	W	IV	LC	M	NRI Wetland, TSC Wetland, Panje
123	Great Black-headed Gull <i>Ichthyaetus ichthyaetus</i>	W	IV	LC	M	NRI Wetland, TSC Wetland, Panje
	<b>Family Rynchopidae</b>					
124	Indian Skimmer <i>Rynchops albicollis</i>	W	IV	VU	R	NRI Wetland, Panje
	<b>Family Columbidae</b>					
125	Rock Pigeon <i>Columba livia</i>	All /NH		LC	R	All areas
126	Yellow-footed Green-pigeon <i>Treron phoenicoptera</i>	F	IV	LC	R	Chirner, Mosare
127	Grey-fronted Green Pigeon <i>Treron affinis</i>	F	IV	LC	R	Karnala Bird Sanctuary
128	Laughing Dove <i>Streptopelia senegalensis</i>	All	IV	LC	R	All areas
129	Eurasian Collared-dove <i>Streptopelia decaocto</i>	GS	IV	LC	R	All areas
130	Spotted Dove <i>Streptopelia chinensis</i>	All	IV	LC	R	All areas



**Annex III: List of birds observed in 10 km radius area of NMIA site (see Abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
<b>Family Psittacidae</b>						
131	Rose-ringed Parakeet <i>Psittacula krameri</i>	All	IV	LC	R	All areas
132	Plum-headed Parakeet <i>Psittacula cyanocephala</i>	F	IV	LC	R	Karnala Bird Sanctuary
133	Alexandrine Parakeet <i>Psittacula krameri</i>	F	IV	VU	R	Chirner
<b>Family Cuculidae</b>						
134	Asian Koel <i>Eudynamys scolopaceus</i>	All	IV	LC	R	All areas
135	Greater Coucal (Southern Coucal) <i>Centropus sinensis</i>	All	IV	LC	R	All areas
136	Common Hawk-cuckoo <i>Hierococcyx varius</i>	All	IV	LC	R	Mosare, Ransai
137	Jacobin Cuckoo <i>Clamator jacobinus</i>	F	IV	LC	M	Chirner, Karnala Bird Sanctuary
138	Indian Cuckoo <i>Cuculus micropterus</i>	F	IV	LC	R	Chirner, Ransai, Mosare
<b>Family Cuculidae</b>						
139	Blue-faced Malkoha <i>Phaenicophaeus viridirostris</i>	All	IV	LC	R	Mosare
140	Sirkeer Malkoha <i>Phaenicophaeus leschenaulti</i>	All	IV	LC	R	Mosare
<b>Family Tytonidae</b>						
141	Common Barn-Owl <i>Tyto alba</i>	NH	IV	LC	R	Panvel
<b>Family Strigidae</b>						
142	Spotted Owlet <i>Athene brama</i>	F/NH	IV	LC	R	Mosare, Ransai
143	Indian Eagle-owl <i>Bubo bengalensis</i>	NH	IV	LC	R	Jasai
<b>Family Caprimulgidae</b>						
144	Indian Little Nightjar <i>Caprimulgus asiaticus</i>	A/GS	IV	LC	R	Ransai
145	Indian Jungle Nightjar <i>Caprimulgus indicus</i>	F	IV	LC	R	Ransai
<b>Family Apodidae</b>						
146	Little Swift <i>Apus affinis</i>	NH		LC	R	All areas
147	Asian Palm-swift <i>Cypsiurus balasiensis</i>	F/NH		LC	R	All areas
<b>Family Alcedinidae</b>						
148	Lesser Pied Kingfisher <i>Ceryle rudis</i>	W	IV	LC	R	Panje
149	White-throated Kingfisher <i>Halcyon smyrnensis</i>	All	IV	LC	R	All areas
150	Common Kingfisher <i>Alcedo atthis</i>	W	IV	LC	R	All wetlands
151	Black-capped Kingfisher <i>Halcyon pileata</i>	W/F	IV	LC	R	NRI Wetland
152	Black-backed Dwarf Kingfisher <i>Ceyx erithaca</i>	F	IV	LC	M	Mosare, Karnala Bird Sanctuary

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Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
153	<b>Family Meropidae</b>					
154	Little Green Bee-eater <i>Merops orientalis</i>	All		LC	R	All areas
155	Blue-tailed Bee-eater <i>Merops philippinus</i>	F/MC		LC	R	Kharghar Creek, Panje, Sonari-Belpada
156	Blue-cheeked Bee-eater <i>Merops persicus</i>	GS/W		LC	R	Sonari-Belpada, Panje
	<b>Family Coraciidae</b>					
157	Indian Roller <i>Coracias benghalensis</i>	All	IV	LC	R	All wetlands areas
158	European Roller <i>Coracias garrulus</i>	All	IV	LC	M	Panje
	<b>Family Upupidae</b>					
159	Common Hoopoe <i>Upupa epops</i>	MC/GS		LC	M	All areas
	<b>Family Bucerotidae</b>					
160	Indian Grey Hornbill <i>Ocyrceros birostris</i>	F	I	LC	R	Mosare, Ransai
	<b>Family Capitonidae</b>					
161	Coppersmith Barbet <i>Megalaima haemacephala</i>	F	IV	LC	R	Mosare, Ransai
162	Brown-headed Barbet <i>Megalaima zeylonica</i>	F	IV	LC	R	Mosare, Ransai
163	White-cheeked Barbet <i>Megalaima viridis</i>	F	IV	LC	R	All Forest areas
	<b>Family Pittidae</b>					
164	Indian Pitta <i>Pitta brachyura</i>	F	IV	LC	R	Mosare, Karnala Bird Sanctuary
	<b>Family Picidae</b>					
165	Eurasian Wryneck <i>Jynx torquilla</i>	F	IV	LC	R	Sonari-Belpada
166	Rufous Woodpecker <i>Celeus brachyurus</i>	F	IV	LC	R	Chirner, Karnala Bird Sanctuary
167	Black-rumped Flameback <i>Dinopium benghalense</i>	F	IV	LC	R	Ransai, Karnala Bird Sanctuary
168	Common Flameback <i>Dinopium javanense</i>	F	IV	LC	R	Ransai, Karnala Bird Sanctuary
169	Yellow-fronted Pied Woodpecker <i>Dendrocopos mahrattensis</i>	F	IV	LC	R	Mosare, Karnala Bird Sanctuary
170	Heart-spotted Woodpecker <i>Hemicircus canente</i>	F	IV	LC	R	Karnala Bird Sanctuary
171	Indian Pygmy Woodpecker <i>Dendrocopos nanus</i>	F	IV	LC	R	Karnala Bird Sanctuary
	<b>Family Alaudidae</b>					
172	Ashy-crowned Finch-lark <i>Eremopterix griseus</i>	GS	IV	LC	R	All Grassland areas
173	Rufous-tailed Lark <i>Ammomanes phoenicura</i>	All	IV	LC	R	All Grassland areas
174	Malabar Lark <i>Galerida malabarica</i>	ALL	IV	LC	R	All wetlands

**Annex III: List of birds observed in 10 km radius area of NMIA site (see Abbreviations on page 1)**

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
175	<b>Family Motacillidae</b>					
176	Citrine Wagtail <i>Motacilla citreola</i>	W/M	IV	LC	M	All areas
177	Yellow Wagtail <i>Motacilla flava</i>	W/M	IV	LC	M	All areas
178	Grey Wagtail <i>Motacilla cinerea</i>	W	IV	LC	M	All areas
179	White Wagtail <i>Motacilla alba</i>	W	IV	LC	M	All areas
180	White-browed Wagtail <i>Motacilla maderaspatensis</i>	W	IV	LC	R	All areas
181	Tree Pipit <i>Anthus trivialis</i>	P/GS	IV	LC	M	All areas
182	Paddyfield Pipit <i>Anthus rufulus</i>	ALL	IV	LC	R	All areas
	<b>Family Hirundinidae</b>					
183	Wire-tailed Swallow <i>Hirundo smithii</i>	All	IV	LC	R	All areas
184	Barn Swallow <i>Hirundo rustica</i>	W	IV	LC	R	All areas
	<b>Family Campephagidae</b>					
185	Common Woodshrike <i>Tephrodornis pondicerianus</i>	F	IV	LC	R	Mosare
186	Large Cuckoo-shrike <i>Coracina macei</i>	F	IV	LC	R	Ransai
187	Black-headed Cuckoo-shrike <i>Coracina melanoptera</i>	F	IV	LC	R	Ransai
188	Small Minivet <i>Pericrocotus cinnamomeus</i>	F	IV	LC	R	Mosare
189	Orange Minivet <i>Pericrocotus flammeus</i>	F	IV	LC	R	Ransai
	<b>Family Irenidae</b>					
190	Common Iora <i>Aegithina tiphia</i>	F	IV	LC	R	Ransai
191	Gold-fronted Leafbird <i>Chloropsis aurifrons</i>	F	IV	LC	R	Ransai, Mosare
	<b>Family Pycnonotidae</b>					
192	Red-vented Bulbul <i>Pycnonotus cafer</i>	All	IV	LC	R	All areas
193	Red-whiskered Bulbul <i>Pycnonotus jocosus</i>	F/MC	IV	LC	R	All areas
194	White-eared Bulbul <i>Pycnonotus leucotis</i>	MC	IV	LC	R	All areas
195	White-browed Bulbul <i>Pycnonotus luteolus</i>	F	IV	LC	R	Chirner
	<b>Family Laniidae</b>					
196	Bay-backed Shrike <i>Lanius vittatus</i>	All	IV	LC	R	All areas
197	'Rufous-backed' Long-tailed Shrike <i>Lanius schach erythronotus group</i>	All	IV	LC	R	All areas
198	Southern Grey Shrike <i>Lanius meridionalis</i>	GS	IV	LC	R	Chirner
	<b>Family Muscicapidae</b>					
199	Orange-headed Thrush <i>Zoothera citrina</i>	F	IV	LC	R	Ransai



## Annex III: List of birds observed in 10 km radius area of NMIA site (see Abbreviations on page 1)

Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
200	Jungle Babbler <i>Turdoides striatus</i>	F	IV	LC	R	Ransai, Mosare
201	Tawny-bellied Babbler <i>Turdoides hyperythra</i>	F	IV	LC	R	Mosare
202	Yellow-eyed Babbler <i>Chrysomma sinense</i>	F	IV	LC	R	Chirner
203	Indian Scimitar-babbler <i>Pomatorhinus [schisticeps] horsfieldii</i>	F	IV	LC	R	Chirner, Mosare
204	Puff-throated Babbler <i>Pellorneum ruficeps</i>	F	IV	LC	R	Mosare
205	Brown-cheeked Fulvetta <i>Alcippe poiocephala</i>	F	IV	LC	R	Ransai
206	Black Redstart <i>Phoenicurus ochrurus</i>	GS	IV	LC	M	Mosare
207	Malabar Whistling-thrush <i>Myophonus horsfieldi</i>	F	IV	LC	M	Ransai
208	Oriental Magpie-robin <i>Copsychus saularis</i>	All	IV	LC	R	All areas
209	Common Stonechat <i>Saxicola torquatus</i>	All	IV	LC	M	All areas
210	Pied Bushchat <i>Saxicola caprata</i>	All	IV	LC	R	All areas
211	Isabelline Wheatear <i>Oenanthe isabellina</i>	GS	IV	LC	M	TSC Wetland
212	Indian Black Robin <i>Saxicoloides fulicatus</i>	All	IV	LC	R	All areas
213	White-rumped Shama <i>Copsychus saularis</i>	F	IV	LC	R	Ransai
214	Bluethroat <i>Luscinia svecica</i>	MC	IV	LC	M	Sonari-Belpada, Kharghar Creek,
215	Blue Rock-thrush <i>Monticola solitaries</i>	GS	IV	LC	M	Karnala Bird Sanctuary
216	Blue-headed Rock-thrush <i>Monticola cinclorhynchus</i>	F	IV	LC	R	Karnala Bird Sanctuary
217	Zitting Cisticola <i>Cisticola juncidis</i>	MC	IV	LC	R	Sonari-Belpada
218	Plain Prinia <i>Prinia inornata</i>	All	IV	LC	R	All areas
219	Ashy Prinia <i>Prinia socialis</i>	All	IV	LC	R	All areas
220	Grey-breasted Prinia <i>Prinia hodgsonii</i>	All	IV	LC	R	Mosare
221	Indian Reed-warbler <i>Acrocephalus [stentoreus] brunescens</i>	MS	IV	LC	M	All mangrove areas
222	Common Tailorbird <i>Orthotomus sutorius</i>	All	IV	LC	R	All areas
223	Lesser Whitethroat <i>Sylvia curruca</i>	GS	IV	LC	M	Panje
224	Red-breasted Flycatcher <i>Ficedula parva</i>	GS/F	IV	LC	M	Karnala Bird Sanctuary
225	Asian Brown Flycatcher <i>Muscicapa dauurica</i>	MC	IV	LC	M	Karnala Bird Sanctuary
226	White-browed Fantail <i>Rhipidura albicollis</i>	MC	IV	LC	M	NRI Wetland
227	Grey-headed Canary-flycatcher <i>Culicicapa ceylonensis</i>	F	IV	LC		Ransai

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Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
228	Asian Paradise Flycatcher <i>Terpsiphone paradise</i>	F	IV	LC		Ransai, Karnala Bird Sanctuary, Chirner
229	Tickell's Blue Flycatcher <i>Cyornis tickelliae</i>	F	IV	LC		Ransai, Karnala Bird Sanctuary, Morbe
230	Black-naped Blue Monarch <i>Hypothymis azurea</i>	F	IV	LC		Karnala Bird Sanctuary, Morbe
	<b>Family Paridae</b>					
231	Great Tit <i>Parus major</i>	NH	IV	LC	R	Panje
232	<b>Family Dicaeidae</b>					
233	Thick-billed Flowerpecker <i>Dicaeum agile</i>	F	IV	LC	R	Ransai, Karnala Bird Sanctuary, Chirner.
234	Pale-billed Flowerpecker <i>Dicaeum erythrorhynchos</i>	F	IV	LC	R	Ransai, Karnala Bird Sanctuary, Chirner.
235	<b>Family Nectariniidae</b>					
236	Purple Sunbird <i>Cinnyris asiatica</i>	All	IV	LC	R	Ransai, Karnala Bird Sanctuary, Chirner.
237	Purple-rumped Sunbird <i>Leptocoma zeylonica</i>	GS	IV	LC	R	Ransai, Karnala Bird Sanctuary, Chirner
238	Small Sunbird <i>Leptocoma minima</i>	F	IV	LC	R	Ransai
239	Vigors' Sunbird <i>Aethopyga vigorsii</i>	F	IV	LC	R	Ransai
240	Loten's Sunbird <i>Cinnyris lotenius</i>	F	IV	LC	R	Karnala Bird Sanctuary
	<b>Family Emberizidae</b>					
241	Red-headed Bunting <i>Emberiza bruniceps</i>	GS	IV	LC	M	NMIA Site
242	Black-headed Bunting <i>Emberiza melanocephala</i>	GS	IV	LC	M	NMIA Site
	<b>Family Fringillidae</b>					
243	Common Rosefinch <i>Carpodacus erythrinus</i>	GS	IV	LC	M	Mosare
	<b>Family Estrildidae</b>					
244	Indian Silverbill <i>Euodice malabarica</i>	P	IV	LC	R	All areas
245	Red Avadavat <i>Amandava amandava</i>	W/MC	IV	LC	R	Sonari-Belpada, TSC Wetland
246	Tricoloured Munia <i>Lonchura malacca</i>	MC	IV	LC	R	Kharghar Creek, TSC Wetland
247	Scaly-breasted Munia <i>Lonchura punctulata</i>	MC/F	IV	LC	R	Kharghar Creek, TSC Wetland, Mosare
248	White-rumped Munia <i>Lonchura striata</i>	F	IV	LC	R	Mosare
	<b>Family Passeridae</b>					
249	House Sparrow <i>Passer domesticus</i>	All	IV	LC	R	All areas
250	Baya Weaver <i>Ploceus philippinus</i>	All	IV	LC	R	All areas

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Sr. no.	Common/scientific names	Habitat	WPA schedule	IUCN status	R/M	Sites
251	Black-breasted Weaver <i>Ploceus benghalensis</i>	All	IV	LC	R	All areas
252	Yellow-throated Sparrow <i>Petronia xanthocollis</i>	F/GS	IV	LC	R	Uran, Mosare
<b>Family Sturnidae</b>						
253	Rosy Starling <i>Sturnus roseus</i>	All	IV	LC	M	Sonari-Belpada, Kharghar Creek,
254	Brahminy Starling <i>Temenuchus pagodarum</i>	GS	IV	LC	R	All areas
255	Grey-headed Starling <i>Sturnia malabarica</i>	GS	IV	LC	R	TSC Wetland
256	Malabar White-headed Starling <i>Sturnia blythii</i>	GS	IV	LC	R	TSC Wetland
257	Asian Pied Starling <i>Gracupica contra</i>	GS	IV	LC	R	All areas
258	Common Myna <i>Acridotheres tristis</i>	All	IV	LC	R	All areas
259	Jungle Myna <i>Acridotheres fuscus</i>	All	IV	LC	R	All areas
<b>Family Oriolidae</b>						
260	Indian Golden Oriole <i>Oriolus kundoo</i>	All	IV	LC	R	All areas
261	Black-hooded Oriole <i>Oriolus xanthornus</i>	F	IV	LC	R	Ransai
262	Black-naped Oriole <i>Oriolus chinensis diffuses</i>	F	IV	LC	M	Ransai
<b>Family Dicruridae</b>						
263	Black Drongo <i>Dicrurus macrocercus</i>	All	IV	LC	R	All areas
264	Ashy Drongo <i>Dicrurus leucophaeus</i>	F	IV	LC	R	Ransai
265	Bronzed Drongo <i>Dicrurus aeneus</i>	F	IV	LC	M	Karnala Bird Sanctuary
266	White-bellied Drongo <i>Dicrurus caerulescens</i>	F	IV	LC	R	Ransai
267	Greater Racket-tailed Drongo <i>Dicrurus paradiseus</i>	F	IV	LC	R	Ransai, Patnoli, Karnala
<b>Family Corvidae</b>						
268	House Crow <i>Corvus splendens</i>	NH	V	LC	R	All areas
269	Indian Jungle Crow <i>Corvus [macrorhynchos] culminatus</i>	All	IV	LC	R	All areas
270	Rufous Treepie <i>Dendrocitta vagabunda</i>	F	IV	LC	R	Mosare