ISSN NO. 2320-5407

*Journal homepage: http://www.journalijar.com*

***INTERNATIONAL JOURNAL OF ADVANCED RESEARCH***

**RESEARCH ARTICLE**

# Status and population trends of Coots and Moorhens at Kolleru wildlife Sanctuary, Andhra Pradesh

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## *Manuscript Info*

***Manuscript History:***

Received: 25 August 2014
Final Accepted: 29 September 2014
Published Online: October 2014

***Key words:***

Rallidae, Jacanidae, Kolleru, Status, Population.

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## *Abstract*

The present study was aimed to study the status, population trends and habitat utilization pattern of small and medium sized wetland birds belonging to the families Rallidae and Jacaniidae at Kolleru wildlife sanctuary, Andhra Pradesh. The Kolleru wetland provides food, shelter, nesting and breeding for many winter and local birds. The population and species distribution of these families showed difference in relation to different habitats during the study period. A total of 10 species belongs to family Rallidae were recorded among which the maximum mean value was recorded for Coots (1440 ± 2162.30) and the minimum mean observed for little Crake (0.08 ± 0.27). Two species of Pheasant tailed jacana and Bronze winged jacana belongs to family Jacaniidae were recorded at Kolleru. The maximum mean value was observed in Pheasant tailed jacana (14.91 ± 6.65) with flock size of 2-28 birds. The percent habitat utilization of family Rallidae was predominantly observed in Reed areas (38.9%) and minimum in open lake (6.6%), while, the family Jacaniidae was recorded high in reed areas (60.1%).



## Introduction

One of the most significant bird sanctuaries in India exists at Kolleru, the largest fresh water lake in Andhra Pradesh with a water spread area of 901 Sq. Km. Geographically the area lies between 80°5' to 81°20'E and 16°32' to 16°57'N. The lake is connected to the Bay of Bengal through a narrow tidal creek known as 'Upputeru' and is fed by 2 rivers, 15 irrigation channels and 15 drains from Krishna and Godavari irrigation system. Thus, the lake swells up during South West monsoon period from August to December. In the summer period, the water spread shrinks to less than 26 sq. km of area. This wetland habitat harbours a variety of flora and fauna (Neelakantan, 1949) and was declared 'a protected area' for Pelicans during 1962. Since 1972, the famed pelicanary was abandoned due to ecological disturbance imposed by man (Mohit *et al*., 2014, Azeez *et al.*, 2011, Sabesh, 2010, Raghavaiah *et al.*, 2006, Nagulu & Ramana Rao, 1983). Now in the present study, the pelican was reported back from 2008 onwards and started nesting in artificial platforms successfully in all the years of study. Inspite of several efforts the lake is facing several threats. These include the roads, bridges, foreshore farm lots and human habitations which break up the organic continuity of the lake. The sewage influx, industrial effluents and pesticide residues seriously affect the lake environment. The lake is totally covered with exotic floating weeds like *Ipomoea aquatica* and *Salvinia* sp. and *Eichltomia* carpeting huge tracts of water surface. These habitat conditions provide good habitat for coots and Moorhens in the region. Cyclone visitations and consequent flood are common to the region. Though the area is declared as a sanctuary, large scale trapping of birds is commonly observed. No detailed population studies were

available on coots and moorhens elsewhere in India, the present paper aimed to evaluate the status and population trends of the family Rallidae and Jacaniidae at Kolleru wildlife Sanctuary.

**Study area:**

Kolleru lake falls between 80°-5' E to 81°-20' E and 16°-32' N to 16°-57' N with total catchment area of 4,763 Sq. Km. This lake is fed by 2 rivers, 15 irrigation channels and 15 drains from Krishna and Godavari barrage irrigation system. Thus, the lake swells up during SW monsoon period from August to December when the level of the lake is around + 7 M.S.L., and shrinks to less than 25 Sq. Km. during May and June. (Fig.1). There are 50 islands and 98 bordering habitations in the lake region having a total population of 2.16 lakhs. The foreshore area is under cultivation up to +5 M.S.L. The area below +5 M.S.L. is generally free from any cultivation, but this area is used for capture fishery. The foreshore area is presently under accelerated conversion into fish ponds for culture fisheries.

The lake is presently facing an ecological crisis being situated in the deltaic region between Krishna and Godavari rivers central' to highly agriculturally and industrially developed area. The industrial pollutants are mainly of organic nature and the agricultural runoff containing nutrients and pesticide residues enter the lake. In addition, the improvements to drainage to remove flood waters by deepening, widening and straightening the out-let creek, has resulted in faster drying up of the lake since 1986 after monsoon. Until 70's the lake level was maintained at more than +5 M.S.L. from July to February and with lesser water level at +3 M.S.L. during March to June. The present situation of longer period of low-level and drying and influx of nutrients, has resulted in coverage of almost the entire area with water hyacinth and other floating weeds, apart from submerged and emergent weeds.

## Methodology:

The populations of aquatic avifauna visiting the different water bodies were regularly monitored from November to March every winter during the study period spanning five years from 2007 to 2012, following the total count method outlined by Gaston (1973) and Steward and Kantrud (1972). Regular observations and all the counts were made during the early hours of the day, that is, between 6.00 AM and 11 AM, the bird species encountered were recorded with the help of 8X40 spotting binoculars and counted with a 20X40 spotting scope. Identification was done with the help of Ali and Ripley (1983b). Habitat preference of small and medium sized waders at the study tanks in relation to the frequency of sightings were calculated using following formula:

$$\frac{\text{Total number of sightings of individual species in one habitat}}{\text{Total number of sightings of all species in the same habitat}} \times 100$$

## Result and Discussion:

**Rallidae:**

Small to medium sized water birds more adapted to marsh habitat. These birds feed on all types of insects and vegetable matters. A total of 10 species of rails, crakes, moorhens and coots were recorded. All the recorded bird species are resident that breed on floating vegetation or in the reed beds of the wetland. The most common and the dominant species are moorhens and coots scattered in various habitats such as fish ponds, canals and marsh habitat. The maximum mean value 1440.00 ± 2162.30 was recorded in coots and the minimum 0.08 ± 0.27 was in Little Crake (Table.1). In this family, purple moorhen (18.25 ± 9.89 to 10.58 ± 6.82) Indian moorhen (1.16 ± 1.77 to 0.66 ± 0.94) and coot (1440 ± 2162.3 to 327.6 ± 333.2) were the dominant population with its flock size varying from 1-6, 3-40, 19-600 birds. These species were recorded in all months in five years of study. Figure 2 indicates the percentage proportion of these species in different years recorded high during 2010-11 (98.7%) and similar trend was noticed in all the rest of the years. The percent distribution of Purple moorhen was recorded maximum in the year of 2008-09 (5.4%), followed by 2011-12 (3.3%), 2007-08 (2.6%), 2009-10 (2.5%) 2010-11 (1.3%), while the Common moorhen was highly represented in the year of 2009-10 (0.9%), followed by 2007-08 (0.5%) and very low in the year of 2011-12 (0.1%), (Fig.3). The Common Moorhen is currently restricted to marsh areas of the lake and these species are prone to seek shelter and disappear on sighting the danger. Similar observations were carried out on Common Moorhen and King Rail by Fredrickson and Reid (1986), in Missouri. It is also noticed that purple Moorhen have adapted to highly artificial habitat and are able to tolerate regular human activity. In coots, more perplexing population fluctuations were observed in different years, this is due to easy adaptability and quick dispersal into the vegetation. Ryan and Dinsmore (1979) briefly summarized the habitat preferences and the breeding of American coots were observed in the undisturbed habitat, when the summer approaches good number of coots move to the areas where the water is maintained all most throughout the year. The breeding of Purple Moorhens and Coot was recorded from late June to mid-August. Nests are seen on the free floating vegetation of the lake or fish ponds, whereas the Common Moorhens breeding was seen in the thick zones of reed beds. Considerable

work has been done on Rallidae which includes American Coot, Common Moorhen. Virginia Rail, Sora, King Rail and Black Rail. Their habitat preference in relation to the vegetation features and water depth variations was studied by Fredrickson et al (1986).

**Jacaniidae:**

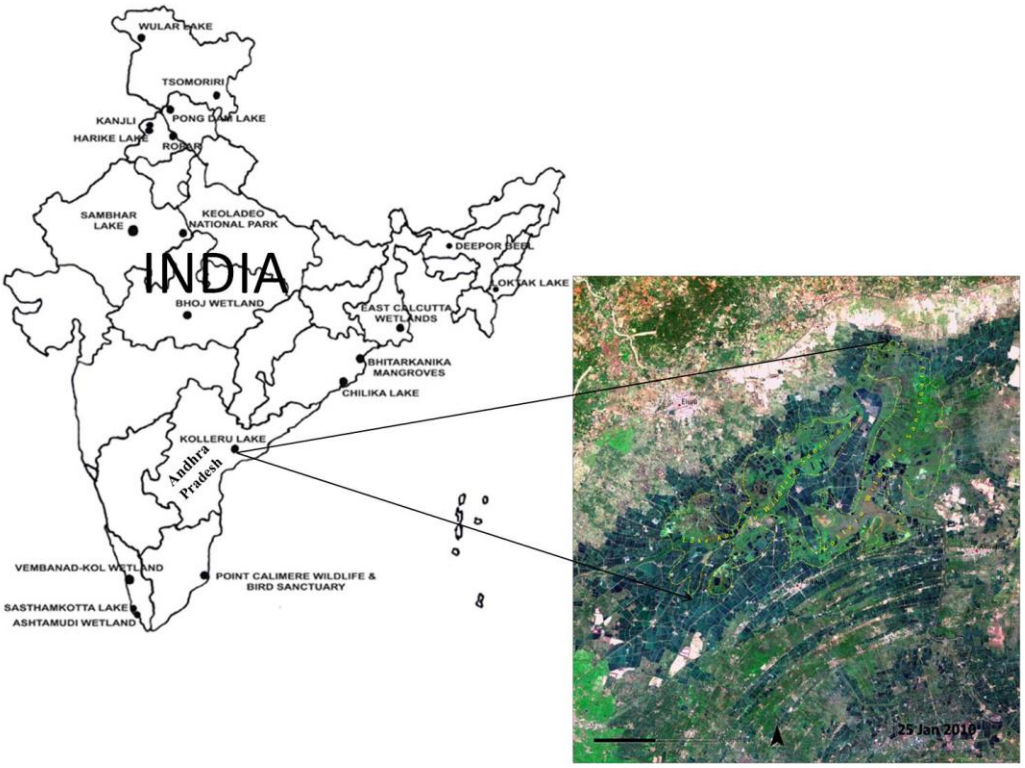
A long legged and elongated-toed water bird adapted to walk lightly over floating leaves and vegetation. Two species namely Pheasant tailed Jacana and Bronze winged Jacana were recorded from this region. Pheasant- tailed Jacanas mean population varies from 14.91 ± 6.65 to 5.61 ± 0.71 with the flock size of 2-28 birds. Whereas, Bronze winged Jacana mean varies from 4.5 ± 2.87 to 2.01 ± 0.70 with a group of 1-10 birds (Table no.1). Jacana population fluctuations were similar to moorhens and coots and these populations were fairly constant in all the years, but more fluctuations were noticed in the year 2008-09 and 2011-12 (Fig.no.4) it has been observed that the birds are seen dispersing into newly created fish ponds and village tanks on account of failure of monsoon. Scarcity of water in the lake and lack of considerable thickness of vegetation were the main reasons for the low populations of Jacanas during that period. The Indian lotus (*Nelumbo nucifera*) provide excellent habitat for feeding. The post monsoon rains (June to July) create suitable habitat for the breeding of Jacanas and it is easy to locate the nesting grounds as these birds nest on free floating vegetation. Heavy rain fall can lead to destruction of the nesting colony (Nagulu *et al.*, 1992) and rebuilding of nest was observed in the winter season from November to December.

**Habitat utilization by family Rallidae and Jacaniidae:**

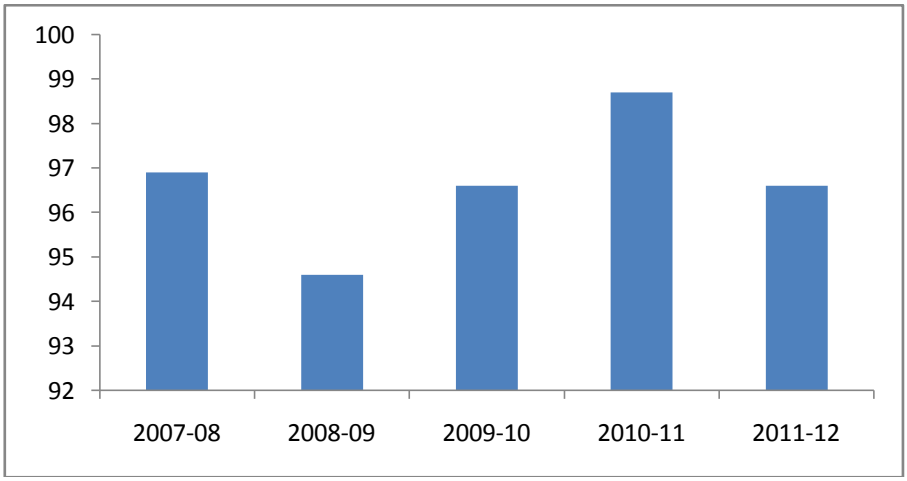
Many habitat types may occur within an area, birds may utilize only a few of these. Most of the birds are strictly confined to particular habitat where abundant natural food and suitable micro habitat exist (Anjaneyulu, 1991). In the present study 6 habitats were identified. The habitat distribution of various species in different habitats was analyzed. The species distribution versus various habitats has been illustrated in figure 5. The family Rallidae was predominantly observed in Reed areas (38.9%), followed by floating vegetation (28.9%), shallow water areas (13.5%), fish pond (11.7%) and Agricultural areas (0.4%) (Fig.6). The family Jacaniidae was highly represented in reed areas (60.1%), followed by floating vegetation (37.8%), shallow water area (1.3%), fish pond (0.8%).Fig.6 while in Agricultural area and open lake areas no bird species were reported. The variation in the utilization pattern of these habitats is mainly attributed to the availability of preferred food and also other microhabitat conditions.

"(Table.1)"Annual variations of Large and small sized waders during the study period at Kolleru

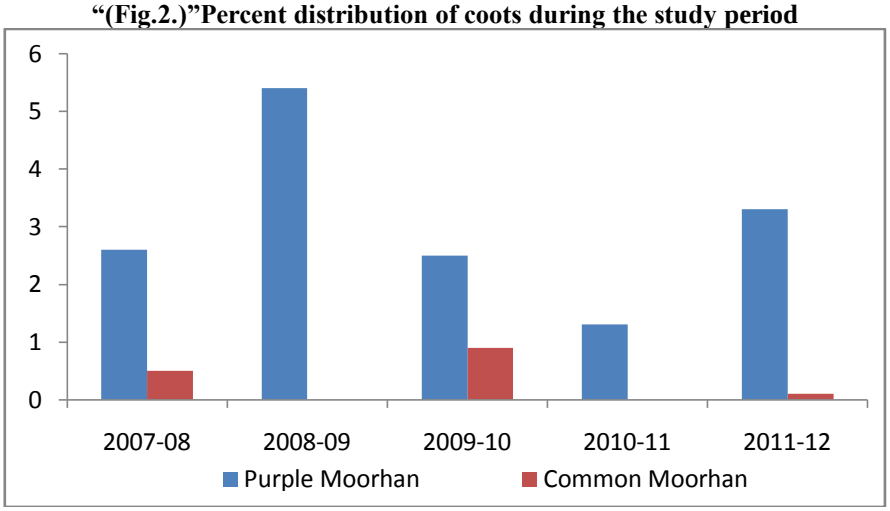
| Sl.No | Species Name | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | C.V | Range |
|---|---|---|---|---|---|---|---|---|
| | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | | |
| **Family: Rallidae** | | | | | | | | |
| 1 | Blue breasted Banded Rail | 0.33 ± 0.47 | 0.08 ± 0.27 | 0.08 ± 0.27 | - | - | 2.67 | 1−1 |
| 2 | Water Rail | 0.80 ± 0.07 | 0.33 ± 0.47 | 0.33 ± 0.62 | 0.41 ± 0.75 | 0.08 ± 0.27 | 3.31 | 1−2 |
| 3 | Banded Crake | 0.80 ± 0.27 | 0.08 ± 0.27 | 0.08 ± 0.27 | - | - | 2.34 | 1−1 |
| 4 | Little Crake | 0.80 ± 0.27 | - | - | 0.16 ± 0.55 | - | 3.31 | 1−2 |
| 5 | Brown Crake | 0.16 ± 0.37 | 0.16 ± 0.55 | 0.25 ± 0.59 | 0.08 ± 0.27 | 3.31 ± 0.16 | 2.67 | 1−2 |
| 6 | White breasted waterhen | 0.41 ± 0.64 | 0.66 ± 0.95 | 0.66 ± 0.62 | 0.41 ± 0.49 | 0.33 ± 0.47 | 1.27 | 1−3 |
| 7 | Water Cock | 0.33 ± 0.47 | 0.33 ± 0.47 | 0.33 ± 0.47 | 0.08 ± 0.27 | 0.27 ± 0.25 | 1.85 | 1−2 |
| 8 | Common moorhen | 1.16 ± 1.77 | 1.25 ± 1.36 | 0.66 ± 0.94 | 0.75 ± 0.82 | 0.82 ± 0.83 | 1.38 | 1−6 |
| 9 | Purple Moorhen | 18.41 ± 7.33 | 18.25 ± 9.89 | 15.91 ± 10.46 | 11.58 ± 4.71 | 4.71 ± 10.58 | 0.52 | 3−40 |
| 10 | Common Coot | 140.30 ± 591.30 | 716.50 ± 683.00 | 693.50 ± 670.00 | 1440.00 ± 2162.30 | 327.60 ± 333.20 | 0.87 | 14-6000 |
| **Family: Jacaniidae** | | | | | | | | |
| 1 | Pheasant Tailed Jacana | 14.91 ± 6.65 | 7.50 ± 6.23 | 10.00 ± 7.29 | 8.16 ± 6.24 | 6.83 ± 5.61 | 0.71 | 2−28 |
| 2 | Bronze Winged Jacana | 3.83 ± 2.64 | 2.75 ± 1.63 | 4.50 ± 2.87 | 2.33 ± 1.79 | 2.33 ± 2.01 | 0.7 | 1−10 |



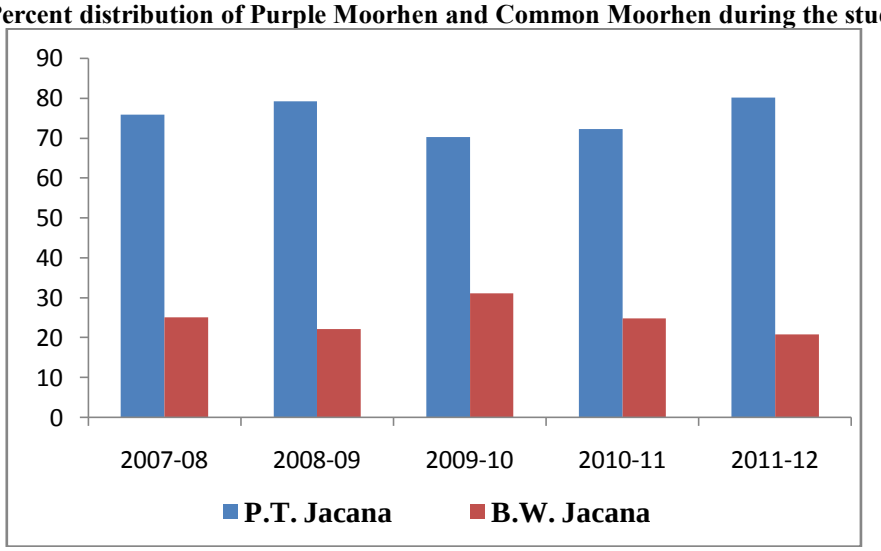

**"(Fig.1.)"Geographical location of Kolleru Lake (Source: Crop aqua culture overwhelms Lake Kolleru A.P. India UNEP).**



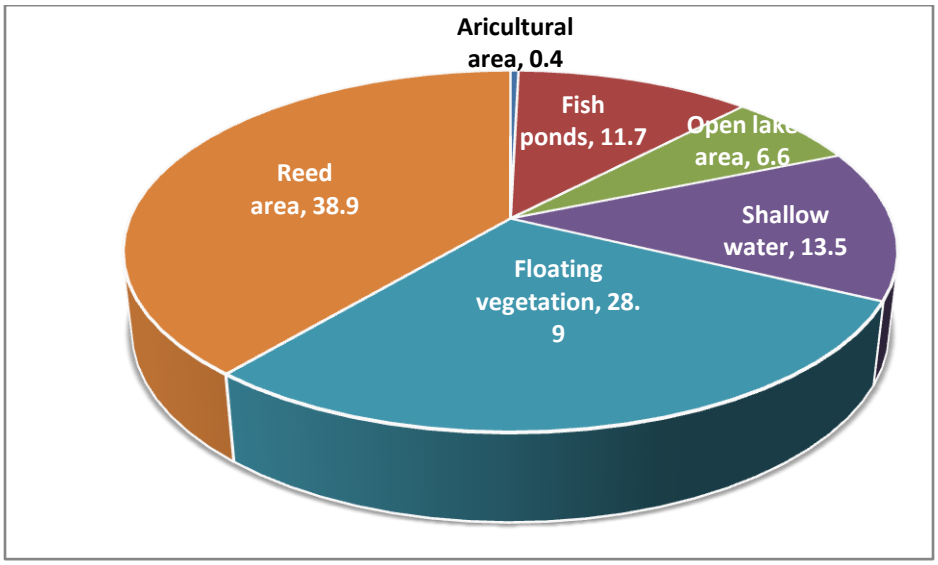

**"(Fig.2.)"Percent distribution of coots during the study period**



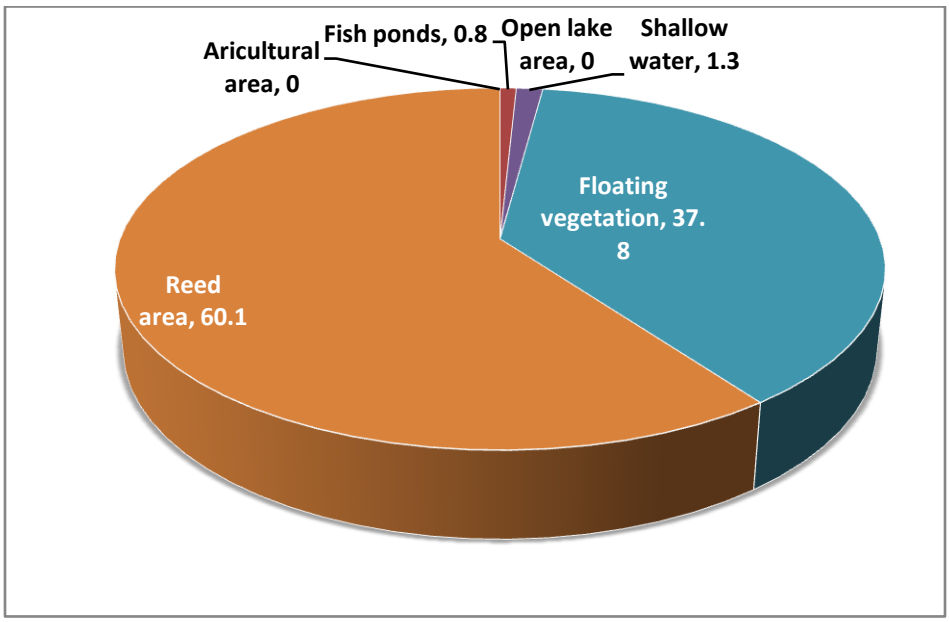

**"(Fig.3.)"Percent distribution of Purple Moorhen and Common Moorhen during the study period**




**"(Fig.4.)"Percent distribution of Pheasant Tailed Jacana and Brownzwinged Jacana during the study period**




**"(Fig.5.)": Percent habitat utilization of the family Rallidaeat Kolleru**




**"(Fig.6.)"Percent habitat utilization of the family Jacanidae at Kolleru**

## Acknowledgement

The authors sincerely extend their thanks to ICAR for providing financial support. Our thanks are also to Acharya N.G. Ranga Agricultural University, Hyderabad for providing necessary facilities during the field work. Finally we extend our thanks to AP forest Department for granting permission to collect data and their support during the field work.

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