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RESEARCH ARTICLE

NESTING SUCCESS IN RELATION TO MEAN REED HEIGHT AND DENSITY AT THE NEST IN INDIAN GREAT REED WARBLER (*ACROCEPHALUS STENTOREUS BRUNNESCENS,* JERDON)

***Mustahson Farooq Fazili**

Department of Zoology, University of Kashmir, Hazratbal Srinagar-190006, Kashmir, India

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ABSTRACT

The study was carried out in Lake Wular between 2007-2009 and in this paper an attempt is made to draw a relationship between the nesting success and average reed height and density at nest in Indian great reed warbler. A positive correlation was found between nesting success and reed height (r = 0.94) and nesting success and reed density (r =0.98). Earlier nests were more susceptible to predation than the later because early nests were located in relatively shorter and less dense vegetation than the later nests. The nesting success during early periods of breeding season was therefore far less in comparison to late periods because of high effect of predation in less dense vegetation.

INTRODUCTION

The nesting studies are of paramount importance in designing conservation plans for maintenance and regulation of bird populations, as a good nesting site generally provides protection against predators, offers adequate stability and materials to support and construct the nest, and also influences hatching success (Ludwig *et al.,* 1994; Kazantzidis *et al.,* 1996; Hilaluddin *et al.,* 2006) fledging success (Buckley and Buckley 1980) and nesting success (Fazili *et al.,* 2010). The size, structure, shape and orientation of the nest are important in providing shelter against adverse weather, particularly high winds, gales and storms (Kim *et al.,* 1998). The nesting success of wetland bird species is of considerable interest to ecologists because these species are useful indicators of wetland productivity, trophic structure, human disturbance and contamination of wetland ecosystems (Custer and Osborn 1977). The objective of the present paper is therefore to describe nesting success in relation to reed density and vegetation height. Many workers have reported on nesting success of different bird species. Reynold *et al.* (2001) indicated that with an increase in the grass in the landscape duck nesting success also increased. Ball *et al.* (1995) found high duck productivity rates on study blocks where large areas of grass remained intact. Based on this a hypothesis was formed that nesting success decreases as the average vegetation density and height around the nest decreases. In the present study an attempt was done to answer this hypothesis.

***Corresponding author: Mustahson Farooq Fazili,** Department of Zoology, University of Kashmir, Hazratbal Srinagar-190006, Kashmir, India.*

Study area

The study was conducted from 2007 to 2009 at Wular Lake (34º15′ to 34º25′ N, 74º32′ to 74º42′ E), a Ramsar Site in the Baramulla and Bandipore districts of Jammu & Kashmir, India. The lake has a maximum depth of 4.9 m with an area of 111.71Sq. Km (Latief 2012), that remains covered with dense growth of free floating and emergent vegetation during the major part of the year. The common species are *Trapa bispinosa, Nymphoides peltatum, Nelumbo nucifera, Ceratophyllum demersum, Hydrilla verticillata, Potamogeton indicus, P. lucens, Butomus umbellatus, Carex sp., Phragmites communis, P. elephantoides, Typha angustata, Myriophyllum verticillatum, Sparganum ramosum, Lemna sp. and Saccharum spontaneum.* Besides several springs that are occasionally seen bubbling up to the surface and streams, especially, Erin, Mudhumati, and Ningal Nallah, the lake is mainly and chiefly fed and drained by the river Jehlum.

METHOD

Nest searching was carried out every fourth day during the breeding season (May to August) of 2007, 2008 and 2009, so that nests could be found during the laying period The nests of birds were generally located in the study sites by wading through reeds in marshy areas (Fazili *et al.,* 2010). A nest was defined as any depression in which the bird laid one or more eggs (Miller and Johnson 1978). Height and density of vegetation at and around the nest was measured at the time when first detected. Vegetation height was measured at the centre of the nest bowl. Height was also measured at four diagonal points one meter each away from the nest centre and

at right angles to each other in order to obtain mean vegetation height (Hill, 1984) around the nest. Density of vegetation at the nest was measured with quadrant method. Slender willow stakes flagged with strips of cloth were used to mark nest locations so that the nests could be relocated (Klett *et al.*, 1988). Nest predation was determined by searching for egg remains. The main egg predators were the common crow (*Corvus splendens*), black kite (*Milvus migrans*) and Mongoos (*Herpestis)*. The nests were also destroyed by grass cutters and egg lifters (Humans).

vegetation as is evident from the table wherein the predation on the earlier nests is profound. The correlation between the nesting success and average reed height and density at nest site was positive (Fig. 1 and Fig. 2) with a correlation coefficient, r = 0.94 and 0.98 respectively meaning that as the average height and density at nest sight increases, the nesting success also increases and vice versa.

Table 1. Data regarding the nesting success and average reed height and density at nest site

Month	Year	No. of nests found (n)	∑n	No. of Success-ful nests (n_s)	Nesting success		Average reed height at nest site (cm) ± SD	Average reed density at nest site (m^2) ± SD
					∑ n_s	%		
May	2007	7	24	3	11		112.5 ±9.6	42.5 ± 4
	2008	8		4		45.83		
	2009	9		4				
June	2007	13	41	7	23		155 ± 8	48.6 ± 5.2
	2008	14		9		56.09		
	2009	14		7				
July	2007	10	36	8	29		175.7 ± 5.6	55.7 ± 4.5
	2008	14		11		80.55		
	2009	12		10				
Aug.	2007	5	13	4	11		186 ± 6.5	56 ± 2.5
	2008	3		2		84.6		
	2009	5		5				

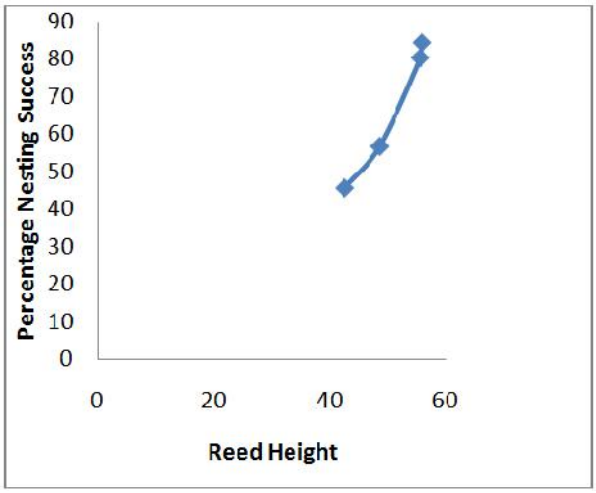

Figure1. Positive correlation between average reed height at nest site and nesting success

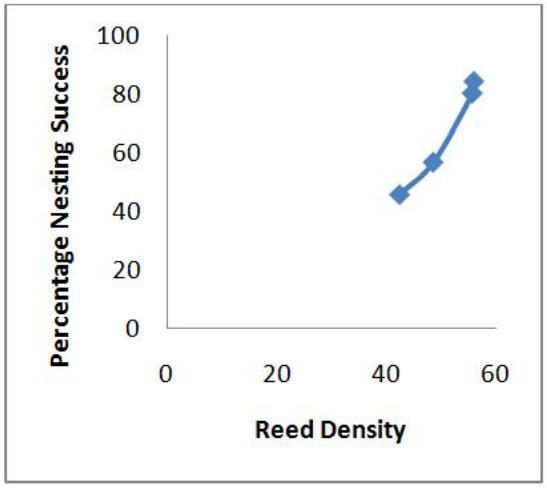

Figure 2.Positive correlation between average reed density and nesting success

RESULTS

A total of 114 nests were found during three seasons with 35 nests in 2007, 39 in 2008 and 40 in 2009. All these nests were detected during the egg laying stage and were found in reeds with dominant vegetation of *Phragmites communis* and *Phragmites elephantoides.* Of these 114 nests 24 were found in May, 41 in June, 36 in July and 13 in August. The average height and density of the reeds surrounding the nests was determined (Table 1). From the table it is clear that the nests in which laying took place in May and June had shorter and less reed density than those nests in which laying started later in July and August. The nests in the shorter and less dense reeds were more susceptible to predation than the nests in tall

DISCUSSION

Indian great reed warbler a regular summer breeding migrant, started egg laying in the earliest nests in the middle of May. Peak laying in Kashmir is 3rd week of June to 1st week of July while as the late breeders lay even in the month of August (Fazili 2002). The early breeders built their nests in relatively shorter and less dense reeds as in the beginning of the growing season the reeds have not attained sufficient height and density to fully conceal the nest and thus suffer predation. But the birds laying later in the season nest at a time when the reeds have attained sufficient density and height to conceal the nests. These late breeders nest in the taller and dense reeds where the

chances of predation are reduced. And also these reeds are least preferred by humans as fodder for their cattle. So late nests are least exposed to predators. Similar results have been reported by many workers. Hill (1984) reported that proportion of mallard nests destroyed by predators increased as the minimum height of vegetation around the nest declined. Lizevy (1981) showed that successful nests were in taller vegetation than nests destroyed by predators. Fayaz *et al*. (2010) has shown negative correlation between clutch predation and mean vegetation height in mallard. Such studies ascertain that warbler populations can achieve maximum benefits if management would concentrate their efforts on creating and restoring large blocks of tall and dense macrophytic vegetation.

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