International Journal of Scientific Engineering and Research (IJSER)
ISSN (Online): 2347-3878
Index Copernicus Value (2015): 62.86 | Impact Factor (2015): 3.791

Study on Nest Predation Rate on Mallard (*Anas platyrhynchos*) in Relation to Average Vegetation Density at Hokersar and Haigan Wetlands Kashmir

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Abstract: ***Ecology of prey species is influenced by predators, which increase mortality and alter the behavior of prey species. Cover at nest sites chosen by breeding birds can lessen the danger of nest predation. Wetlands of Kashmir give rearing locales to various waterfowls like Mallard, Common Moorhen, Purple moorhen, Dabchick, Pheasant followed jacana and egrets etc. Predation is the significant reason for nest failure, impacting the number of inhabitants in prey species. Exhibit think about was completed at Hokersar and Haigam wetlands from March 2014 to July 2017.This study concentrated on Prehatch predation of mallard at Hokersar and Haigam wetlands in connection to vegetation thickness and home conveyance. Predation rate was observed to be greatest amid early spring as vegetation was scanty. Fringe homes were observed to be more inclined to predation than those nests which were found in thick typha vegetation. 34% predation rate was found at hokersar and around 38.66% predation rate was found at haigam wetland individually. By applying SPSS measurable technique a negative corelation was found between vegetation thickness and nest predation rate. Haigam confronted high predation stretch contrasted with Hokersar because of less administration and high anthropogenic weight at haigam wetland. Real predators were common crow, yellow billed blue magpie, Marsh harrier and Black kite.***

Keywords: predation, Hokersar, Haigam, Magpie, Mallard, predation, Marsh harrier

1. Introduction

Predation significantly affects avifaunal diversity and their complex reproductive procedures which rely on upon various elements influencing predator-prey relationships. Diverse impermanent and spatial patterns of nourishment dispersion are responsible for evolution of avian conceptive procedures (Horn 1968). The intensity and type of predation consequences for adult birds and their nests are another essential element for development of avian conceptive procedures (Kruuk 1964, Lack 1968, Ricklefs 1969). Changes in territories basic to the reproducing success of waterfowl and in predator populace are imperative elements for their predation issues. Such changes impact predation rates on waterfowl. Breeding birds experience the ill effects of interminable weakening and loss of basic living spaces over quite a bit of their reproducing range in light of infringement by farming, industrial, and private advancements (Sugden and Beyersbergen 1984, Petersen and Hogan 1996). Numerical and composition changes similarly have occurred among predator groups and populaces in many duck reproducing territories, which frequently antagonistically influenced survival of duck species (Johnson and Sargeant 1977, Sargeant et al. 1993, Sovada et al. 1995). Decrease in plenitude or low densities of ducks eventuate a populace that is less ready to withstand the normal scope of predation rates (Raveling 1989). For the most part, more than one element is included when predation contrarily impacts waterfowl populations.

Mallards, (*Anas platyrhynchos*), are among the most widely recognized waterfowl species in the Northern Hemisphere. Regardless of their plenitude and in spite of developing enthusiasm of behavioral scientists and developmental researcher in key parts of their conduct, a little work has been done on their nest predation rates and survival. Antipredatory strategies may be favored, if prey cannot defend itself against predators, it must adapt itself to avoid predators by nest concealment, spacing out that increases camouflage of nesting activities and breeding at inaccessible sites or in safer habitats. However mallard at Hokersar and Haigam wetlands faces a lot of problems due to loss of vegetation cover because of various anthropogenic activities like vegetation harvesting by local people and cattle grazing. Nest site selection is important for survival of birds. Female ducks of species such as the mallard (*Anas platyrhynchos*) are thought to be more philopatric than males, (Anderson et al., 1992; Johnson and Grier, 1988; Rohwer and Anderson, 1988) found that adults are more philopatric than juvenile birds. In addition, philopatry is thought to covary with wetland conditions on the breeding grounds. It is clear that wetland conditions influence duck reproduction (e.g., Miller and Newton, 1999; Pospahala et al., 1974), and if pond numbers in a region are high, as in a very wet year, ducks are more likely to be philopatric. Another possible relationship involving wetland conditions is that mallards may use their experience and wetland conditions from the current year as an index to future habitat and breeding success (Danchin and Wagner, 1997, Danchin et al., 1998). this behavoiour is consistant with the mallard in kashmir wetlands. The mallard stays, breed and nourish themselves in the wetlands during summer season and when winter comes these birds may or may not migrate with the migratory flock during their back migration to far northern countries on the onset of spring.

2. Study Area

This study was carried at Hokersar and Haigam wetlands in the northern area of Kashmir valley.

Hokersar wetland (34° 06′ N scope, 74° 05′ E longitude) lying in the Northern most piece of Doodhganga catchment is an ensured natural life hold and a Ramsar site at a height of 1,584 m (amsl). The wetland harbors around two million migratory waterfowl amid winter that relocate from Siberia and the Central Asian locale. The wetland is nourished by two bay streams, Doodhganga (from east) and Sukhnag Nalla (from west). The wetland achieves a most extreme profundity of 2.5 m in spring because of gratefulness in release from the snow-melt water in the upper compasses of Doodhganga catchment. The water profundity in fall time is least at 0.7 m.Doodhganga, situated in Kashmir Himalaya, India is one of the real left-bank catchments of Jhelum River. It is arranged between 33° 15′–34° 15′ scopes and 74° 45′–74° 83′ longitudes covering a region of 732.6 km^2. It is limited by grandiose Pir Panjal Mountain Range on south. The catchment has a fluctuated geography and displays altitudinal extremes of 1,548 to 4,634 m (above mean ocean level (amsl). Its alleviation is various, involving steep slants, levels, fields, and alluvial fans. Topographically, the region comprises of Panjal traps, limestone, Karewa Formation, and Recent Alluvium. The trademark Karewa Formation in moderately bring down heights is perfect for agriculture. The review territory encounters mild atmosphere with the normal winter and summer temperatures going from 5 to 25 °C, individually. The normal yearly precipitation is around 660 mm as rain and snow. Doodhganga stream, one of the critical lasting tributaries of waterway Jhelum, is the fundamental seepage and water asset in the catchment. Doodhganga stream streams for a course of around 56 km preceding discharging into Hokersar wetland.

3. Methodology

The Mallard is a waterfowl species that commonly breeds in the wetlands of Kashmir, yet limited information exists on early pre-hatch and post-hatch duckling survival. Few previous studies have endeavored to determine predation rates on Mallard eggs and ducklings, although this has been determined that mallard eggs are under threat of corvids and kites Therefore, we attempted to determine the significance of clutch predation on Mallard ducks at Hokersar and Haigam wetlands. We hypothesized that although often referred to as substantial predators of ducklings, the corvids and raptors would consume young waterfowl less frequently than their eggs. We also estimated the effects of vegetation density on nests of mallard. Strip transect method was used to locate the nests of mallard during its breeding season between March to June for three year surveys in 2014-2016. Nest searching was carried out every 3rd day during their breeding season, so that nests could be found during laying period. Most searches were done close to boat channels. Mallard laid its eggs in different vegetation types, like in the depression made in typha, willow trunks and hollows of willow trees (Shah *et.al*2009).Slender willow stakes flagged with red cloth was used to mark nest locations so that the nests could be relocated (klett *et.al* 1988). Height and density of vegetation cover was measured around the nests using 1m^2 quadrants and using an inch tape. The length of vegetation cover was measured from the water surface to the tip of the plant. for measuring the vegetation density we placed three transects in which nests were located and in each transect we placed 10 quadrants and calculated the vegetation density within each transect. We then calculated the average vegetation density monthly so as to compare the rate of predation and vegetation density in the wetland for consecutive three year study. Predation was confirmed when there was partial or whole eggs lost from the nest and adult bird was not found on or near its nest. For statistical analysis SPSS statistical software was used. A correlation analytical test was done to find out the significant test results.

4. Results

Around 135 mallard nests were found at Hokersar and around 75 were found in Haigam wetland amid three year study from 2014-2016. Mallard eggs and their ducklings were under the real threat of predation by corvids and raptors. 46 nests were decimated by predators at Hokersar wetland and around 29 at Haigam. This shows 34% predation rate at Hokersar and 38.66% predation rate at Haigam wetlands individually. Early grasps were discovered more inclined to predation than late ones as vegetation is less dense at ahead of schedule in the spring than later. The main nest predators were common crow, jungle crow, yellow-billed blue magpie, black kite, night heron and marsh harrier. Although the bird under study shows a philopatric behaviour but due to high predation rate and habitat destruction, mallard move back to its native breeding ground and avoid to breed in the wetlands of kashmir valley. Thats why only a small flock breed in the hokersar and haigam wetlands of kashmir. When the results were corelated with the vegetation density using SPSS statistical method it was found that a negative corelation exists between vegetation density and nest predation rate in both the wetlands (Table 1and 2, Fig. 1 and 2).

Table 1: hokersar nest predation rate and vegetation density in different months of mallard breeding season during 3 year study from 2014-2016

Months	Year	No. of mallard nests	∑n	No of predated nests	∑np	Predation rate, (%)	Vegetation density
March	2014	9	23	4	11	0.478 (47.8%)	23±6
	2015	6		4			
	2016	8		3			
April	2014	12	37	5	14	0.378 (37.8%)	43±7
	2015	12		5			
	2016	13		4			
May	2014	14	36	4	12	0.33 (33%)	62±3
	2015	14		5			
	2016	12		3			
June	2014	8	22	2	5	0.227 (22.7%)	72±2
	2015	8		2			
	2016	6		1			
July	2014	5	17	0	4	0.235 (23.5%)	68±4
	2015	6		2			
	2016	6		2			
			135		46		

By analyzing the correlation test between vegetation density and nest predation of mallard survival using SPSS statistical software we found a negative correlation of -0.972with a significance value of 0.006 as **correlation is significant at the 0.01 level (2-tailed).

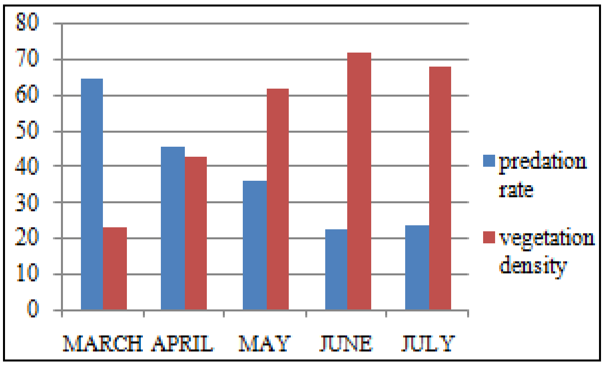

Figure 1: Bar graph showing a negative correlation between nest predation rates and vegetation cover and density at Hokersar wetland

Table 2: Nest predation rate and vegetation density at haigam wetland for analyzing effects on mallard breeding success in different months of mallard breeding season during 3 year study from 2014-2016.

Month	Year	No of mallard nests	∑n	No of predated nests	∑np	Predation rate (%)	Vegetation density
March	2014	5	12	3	7	0.58 (58%)	24±3
	2015	2		2			
	2016	5		2			
April	2014	8	23	3	10	0.434 (43.4%)	46±4
	2015	6		4			
	2016	9		3			
May	2014	7	21	2	7	0.33(33%)	60±3
	2015	8		3			
	2016	6		2			
June	2014	3	11	1	3	0.27 (27%)	67±4
	2015	5		2			
	2016	3		0			
July	2014	2	8	1	2	0.25 (25%)	71±4
	2015	2		1			
	2016	4		0			
Total			75		29		

By analyzing correlation between vegetation density and nest predation using SPSS statistical software we found a negative correlation of -0.999 with significance of 0.000 (2-tailed) as **correlation is significant at the 0.01 level.

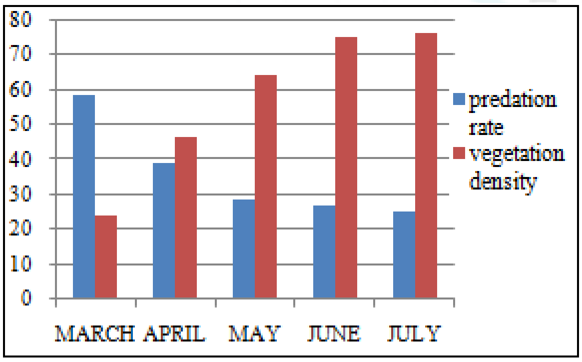

Figure 2: Bar graph showing negative correlation between mallard nest predation rate and vegetation density at Haigam wetland

5. Discussion

Height and vegetation density play a significant role in survival of mallard eggs and nestlings. In contrast studies of other Anseriforms have reported lower sensitivities and elasticities for nest success and have concluded that sensitivities of adult survival greatly exceeded that of nest success (Flint *et.al* 1996, Rockwell *et. al* 1997 and Schmutz *et.al* 1997). we correlated predation rate with vegetation density of wetland, as several studies (Kluijver 1951,Crawford 1980,Wilson 1966) have correlated nest success with several environmental and physiological factors. Major loss of vegetation in wetlands was found destroyed by local people who harvest typha grass for feeding their cattle and sheep. Decrease in vegetation cover destroys nest concealment which in turn make nests visible to predatory birds. Corvids were found to be major nest predators, as also found by (Shah et.al 1984). In response to mandates to protect waterfowl populations and provide compatible harvest opportunities, management efforts have focused on increasing population growth rates by improving vital rates through management of habitat or predator communities and by regulating harvest (Nichols *et.al* 1995), such methods have not been employed yet in the kashmir wetlands. considerable effort has been directed to determining how specific vital rates are influenced by environmental fluctuations (Rotella *et. al* 1993 and Ratti 1992, Greenwood *et. al* 1995 and Sovada *et. al* 1995) or management actions (e.g., Smith and Reynolds 1992, Kruce and Bowen 1996 Mckinnon and Duncan 1999, Garrettson and Rohwer 2001). Formal perturbation analysis for mallard has not been done so far.Based on model-regression coefficients, nests initiated earlier in the season, in dense vegetation, and with closer nearest neighbors were more likely to successfully hatch. Also relative variable weights indicated that nearest neighbor distance was a much better prediction of nest success than nest vegetation.(Kevin M. Ringelman et al 2013). This finding is is inconsistent with our results as early nests has a meager survival rate due to high predation impact on early nests as vegetation density is less. However nesting in late spring have a much better survival rates due to high vegetation cover and better concealment from predators.

6. Conclusion

Mallard faces a lot of predation pressure in the two wetlands at its early stages of breeding period. This high predation pressure is enhanced by mismanagement . Local people harvest typha. spp. grass from these wetlands and also cattle and sheep are often found to feed in the wetlands , thus making the vegetation cover sparse and making the nests prone to predation by corvids and raptors. Everywhere in the biosphere there exists a balance between predator-prey relationship. But due to anthropogenic activities this balance is wrecked. Proper management activities can lower this pressure. Avoiding typha. spp. harvesting during breeding season of birds and prevent entry of cattle into the wetland premises can help mallard to flourish well in the wetlands of Kashmir valley.

7. Acknowledgment

We are highly thankful to the Department of Wildlife, Jammu and Kashmir for providing facilities to enter and survey the wetland area. We are highly obliged to the Department of Science and Technology for proving funds through INSPIRE fellowship, to carryout the research and field survey.

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