

## The Effects of Habitat Loss Due to Reed Fires on Waterfowls at Van Lake Basin

<sup>1</sup>Atilla Durmus and <sup>2</sup>Humeyra Nergiz

<sup>1</sup>Department of Biology, Faculty of Science, Yuzuncu Yil University, Van, Turkey

<sup>2</sup>Department of Biology, Faculty of Science and Art, Bitlis Eren University, Bitlis, Turkey

**Abstract:** In this study, the impacts of reed fires on waterfowls were investigated at Lake Ercek, Lake Arin and Lake Norsin at Van Lake Basin. Observations and censuses were carried out to determine adult and chick rates of waterfowls, such as *Anas platyrhynchos*, *A. clypeata*, *Fulica atra*, *Aythya ferina*, *Oxyura leucocephala* and *Podiceps nigricollis* which breeds and rests at these wetlands. In these surveys, population size of these species before and following the fire were compared and assessed statistically. It was determined that reed fires were set in Autumn (October to November). After harvest of planted agricultural areas around the wetlands, reed fires were set by shepherds who graze animals through there. Fires were seen most frequently at Lake Norsin. Although, most of reeds through inshore of Lake Norsin were damaged, reeds on island in center of the lake were not affected by fires. Due to distance of Lake Arin to settlements, reed fires were seen seldomly there.

**Key words:** Van Lake Basin, waterfowl, reed fire, ecology, feeding

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### INTRODUCTION

Because of its biodiversity, wetlands are accepted as the natural wealth museums of the world. They are the most important ecosystems of the earth with their natural functions and economic values. The wetlands which are regarded as one of the most important reasons for the rich bird fauna of our country provide birds as well as some other species with suitable feeding, breeding and sheltering grounds. Especially for those forestless regions, the wetlands have the densest biodiversity. Those wetlands take on the task of the forests (Adizel *et al.*, 2004).

Lake Van Basin is quite rich in wetlands. Reed fields and marsh areas which are formed in the meeting points of fresh waters and the lake in the basin are of vital importance for the feeding, sheltering and breeding of the waterfowls. Because of their abundant food supply and sheltering opportunities, many bird species prefer those areas. However due to improper practices, those areas like their counterparts in the world have been rapidly ruined (Adizel and Durmus, 2005).

Ever-repeating uncontrolled cutting and burning of the reeds bring about a decrease in the tallness and diameter of the reeds. Fires may help to kill invasive weeds in the area and so increase the quality of the habitat. This desirable situation happens in Autumn and

Winter when the water levels are high and the wind speed is moderate. However, the fires in the period in question generally are not goal-oriented and well-planned. Therefore, one cannot say that all the fires in the Autumn are helpful. The effects of severe fires in this period may not be seen immediately however, they have long-term effects on the ecosystem. The fires in the Spring and Summer prevent the reeds from growing and so they severely do harm the vegetation in the area (Jandt and Morkill, 1994; Whelan, 1995; Tarr *et al.*, 2006).

The effects of the reed fires have many direct or indirect effects on the species. These effects are generally on the habitat (biotope), feeding, breeding and behaviours of the species. In many wetlands, the birds generally prefer reed fields dominated by *Phragmites australis* as their nesting ground. *P.australis* is a common species found in temperate and subtropical regions.

The reason for its dominance in the area is its advantage in the competition with other terrestrial species. Therefore, the spread of this species is encouraged while making a wetland management plan. Still, an above-normal increase in reed density in a wetland has adverse effects on the biodiversity in the area. Many duck species prefer to nest in near-coastal areas with low reed density rather than the areas with very high reed density (Van't Hul, 1995; Nelms and Ballinger,

2007). In this study, the effects of the reed fires on the wetland ecosystem and on the breeding success of the waterfowls have been analyzed. The data of this study have been believed to be guiding in terms of making the wetland management plan and keeping the reed fires under control.

## MATERIALS AND METHODS

The study in which the effects of the reed fires in the wetlands on the habitat choice, behaviours, feeding and breeding activities of the waterfowls were searched was conducted in Ercek, Arin and Norsin Lakes in the Lake Van Basin between 2007 and 2009 (Fig. 1).

To determine the chick and adult bird rates of the waterfowls like *Anas platyrhynchos*, *A. clypeata*, *Fulica atra*, *Aythya ferina*, *Oxyura leucocephala* and *Podiceps nigricollis* that nest and breed in the wetlands designated as the working field, the observation and census were made.

The observations in the areas were concentrated on the July when the water level is balanced and the breeding activities climax. Population density of the species were determined by using Line transect and Point counts methods (Dobinson, 1976; Bibby and Burgess, 1992). The population sizes of the species before and after the fire in the areas were compared and statistically evaluated thanks to the census.

The statistical analysis was conducted to evaluate 2 years land data and to compare with each other. ANOVA method was used and Tukey test was made in the comparison of the population sizes of the lands before and after the fire and in the determination of the differences in the numbers of chick birds based on the severity of the fires.



Fig. 1: Van Lake Basin

## RESULTS

It was found out that the reed fires in Lake Van Basin were generally broken out in Autumn (October to November). It was determined that after the harvest of the planted areas around the wetlands, generally the shepherds burned the reeds with no reason or for the purpose of seeing the animals clearly when they got into the reed field. The area where the fires were most frequently seen is Norsin Lake (Fig. 2). While the majority of the reed fields by the lakeside was damaged in the fire broken out in Autumn period in 2007 in the area, the reed field on the island found in the middle of the lake was confirmed to be unaffected of the fire. The island served as a good shelter and a safe area for those species escaping from the fire. There were moderate fires in the reed fields in Ercek Lake in the same year and in the same period.

Because of its proximity to residential areas, the area where the fires are most rarely seen is Arin Lake. However, the reed fields in the area were partially damaged because of the fires started by the hunters at the end of the breeding season in 2008.

When the total numbers of the chick and adult birds were evaluated, it was found out that there was not a big statistical difference between the fields and the years ( $p>0.05$ ). However in Norsin Lake where severe reed fires were broken out in 2007, the chick numbers of *Aythya ferina*, *Oxyura leucocephala* and *Podiceps nigricollis* which feed by diving beneath the surface of the water were found to have decreased in 2008 (Table 1). The effects of the fires in Ercek and Norsin Lakes were found to be statistically important on *A. ferina* and *P. nigricollis* ( $p<0.05$ ) species but not important on *O. leucocephala* species ( $p>0.05$ ) (Table 1). In this period, there was an increase in the chick numbers of *Anas platyrhynchos*,



Fig. 2: Reed fires to Norsin Lake in 2007

Table 1: Distribution of feed by diving offspring species according to years and areas

Species (n)									
<i>Aythya ferina</i>			<i>Oxyura leucocephala</i>			<i>Podiceps nigricollis</i>			
Area			Area			Area			
Years	Ercek	Norsin	Arin	Ercek	Norsin	Arin	Ercek	Norsin	Arin
2007	38	23	201	14	15	22	25	9	35
2008	26	18	200	11	13	30	13	4	32
2009	24	21	186	18	42	16	20	6	30
p-values	<0.05	-	-	>0.05	-	<0.05	<0.05	-	>0.05

Table 2: Distribution of feed by surface offspring species according to years and areas

Species (n)									
<i>Anas platyrhynchos</i>			<i>Anas clypeata</i>			<i>Fulica atra</i>			
Area			Area			Area			
Years	Ercek	Norsin	Arin	Ercek	Norsin	Arin	Ercek	Norsin	Arin
2007	48	22	420	233	8	502	310	83	778
2008	54	25	423	255	10	500	380	86	780
2009	55	26	460	257	9	520	386	85	783
p-values	<0.05	-	-	<0.05	-	>0.05	<0.05	-	>0.05

n = Offspring number

*A. clypeata* vs. *Fulica atra* in both lakes when compared to the numbers of 2007 ( $p < 0.05$ ). The number of the individuals of the species nesting in Arin Lake has not changed much by years. After the moderate fire in the area in Autumn period in 2008, there was a slight increase in the chick numbers of *Anas platyrhynchos*, *A. clypeata* and *Fulica atra* in 2009. However, this increase was not statistically significant ( $p > 0.05$ ) (Table 2).

## DISCUSSION

It was determined that the reed fires had direct and indirect effects on the habitat choice and population sizes of the waterfowls. The numbers of chick and adult birds which was severely affected by the fire in Autumn decreased in the next breeding period. Especially the chick numbers of *Aythya ferina*, *Oxyura leucocephala* and *Podiceps nigricollis* which feed by diving beneath the surface of the water decreased. However, it was found out that the effect of the reed fires on the population size of the waterfowls in the fields was not statistically important. In the fields severely damaged by the fire, the reeds were quite weak in the next breeding period. Still, if there are not successive severe fires in the field, the reed field would be in a better condition than before, after two seasons at most (McWilliams *et al.*, 2007). The researches conducted in a more elaborative way on the field choices and daily activity models of the waterfowls have asserted that the wetlands with a balanced distribution of vegetation and open water basins are more preferred by the waterfowls (Siegfried, 1976; Stoudt, 1982; Johnsgard and Carbonell, 1996; Nergiz *et al.*, 2011). In the areas where less severe fires were broken out, it was

easier for the reeds to bush out over again. The chick numbers of *Anas platyrhynchos*, *A. clypeata* and *Fulica atra* which nest and feed from the surface increased. Jandt and Morkill (1994) linked this situation with the emergence of proper feeding fields for those species feeding from the surface thanks to the fire which increases the herbal production in the marsh areas.

Many studies on the other hand, emphasized that the waterfowls prefer to nest in the areas with sparse and scattered reed groups instead of the areas with thick and tall reed groups (Jandt and Morkill, 1994; Isacch *et al.*, 2004; Brennan *et al.*, 2005). However, if there are successive fire outbreaks for a few years, there is no increase in herbal production and this situation is a disadvantage for the waterfowls as well. Therefore, it is important to be careful about the reed fires in the wetlands. While making a wetland management plan, the amount and the timing of the reed cuttings and burnings should be well-planned. While making the management plan, it is important to bear in mind the habitat needs, incubation periods and times of the species nesting and breeding in the field.

## CONCLUSION

It was observed that reed fires affects waterfowls directly or indirectly. Also at seriously affected areas by reed fires in Autumn, population size of chicks were decreased in the next reproduction season. It was observed that on more moderately burned areas, chick population of dabbling ducks like *Anas platyrhynchos*, *A. clypeata* and *Fulica atra* which were fed at surface were increased depending on food but divers like *Aythya*

*ferina*, *Oxyura leucocephala* and *Podiceps nigricollis* were decreased. But, it was detected that fire did not produce any statistically detectable positive or negative effects on waterfowl' population size in the first 2 years following the fire ( $p>0.05$ ).

#### ACKNOWLEDGEMENT

Researchers would like to thank Dr. Suna Akkol for her contributions to the statistic part of this study.

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