Acta Biologica Turcica 32 (2) 65-69 2019 Received 19 Nov. 2018; Accepted 24 Feb. 2019

ACTA BIOLOGICA TURCICA

E-ISSN: 2458-7893, http://www.actabiologicaturcica.com

Original research

Spring migration phenology of wheatear species in Southern Turkey

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Abstract: Millions of birds migrate between breeding and wintering areas every year. Turkey has many important areas for migratory birds as stopover or wintering. The coastal line of the southern Turkey provides safety resting areas and rich opportunity for refueling. Boğazkent is one of the important area just coast line of the Mediterranean Sea and we studied the migration phenology and stopover durations of three Wheatear species: Northern wheatear (*Oenanthe oenanthe*), Isabelline wheatear (*Oenanthe isabellina*) and Black-eared wheatear (*Oenanthe hispanica*). Addition to these species, Desert wheatear (*Oenanthe deserti*) and Finsch's wheatear (*Oenanthe finschii*) also were captured in the study. Birds were captured by using spring traps baited with mealworms, *Tenebrio molitor*, throughout the daylight period from the 1st of March to the 31st May both in 2009 and 2010. More northern wheatears use this site to stopover. It was determined that the spring migration of the Northern wheatear at study site takes two months, whereas Isabelline and Black-eared wheatears have almost one-month migrations in southern Turkey after passing the Mediterranean Sea. On the other hand, timing of spring migration has differences between wheatear species.

Keywords: Ecological barrier, Migration, *Oenanthe* spp., Phenology, Turkey, Wheatears

Citing: Karaardiç, H., & Erdoğan, A. (2019). Spring migration phenology of wheatear species in Southern Turkey. *Acta Biologica Turcica, 32*(2): 65-69.

Introduction

Migratory birds spend much energy during their long journeys. This incredible migration journeys require optimal conditions to reach breeding or wintering areas. During this migration, stopover sites play an important role (Bairlein, 1994; Wikelski et al., 2003). Migratory birds spend most of their time on stopover sites between breeding and wintering areas (Hedenström and Alerstam, 1998).

All migratory birds have to overcome difficult ecological barriers, so they need enough energy reserves. The most important energy source for migration is fat depot (Totzke et al., 1997; Totzke and Bairlein, 1998). Garden warbler (*Sylvia borin*) - 16-18 g bird- raises its body weight to 34 g before the Sahara Desert (Bairlein, 1994; Totzke and Bairlein, 1998) and 24 g before the Mediterranean (Karaardıç et al., 2006) barriers. McClintock et al. (1978) reported, 80 species fly 900 km, some species 600 km, especially some warblers and coastal birds longer than 2000 km without stopping over. The longest transoceanic migratory bird is Amur falcon (*Falco amurensis*). In autumn migration, this bird flies over 4000 km directly from India to South Africa (Newton, 2008). Similarly, Northern wheatear (*Oenanthe oenanthe*) flies away the North Atlantic (2000-3000 km) between Greenland and Europe (Dirschke and Delingat, 2001).

Black Sea and the Mediterranean are long ecological barriers for many migratory birds. Turkey has many important stopover sites for refuelling across the north to the south. The Mediterranean Sea is one of the main ecological barriers of Eurasian migrants. According to the "Optimal bird migration" theory (Alerstam and Lindström, 1990), time, energy or predation are

important arguments to have different migration strategies of different species, even different populations of same species (Houstan, 1998; Hedenström, 2008; Schmaljohann et al., 2011). In this study, we aimed to understand migration phenology and stopover time of Northern wheatear, Isabelline wheatear (*Oenanthe isabellina*) and Black eared wheatear (*Oenanthe hispanica*) after the Mediterranean Sea in spring migration.

Materials and Methods

The study was conducted at Boğazkent on the coast line of southern Turkey (36°50'N, 31°11'E, just over sea level) (Fig 1). This is an area of over 200 ha of shrub steppe, arable fields, marshlands, grasslands and farmlands. The site has a typical Mediterranean climate consisting of hot and dry summers and mild but windy winters.

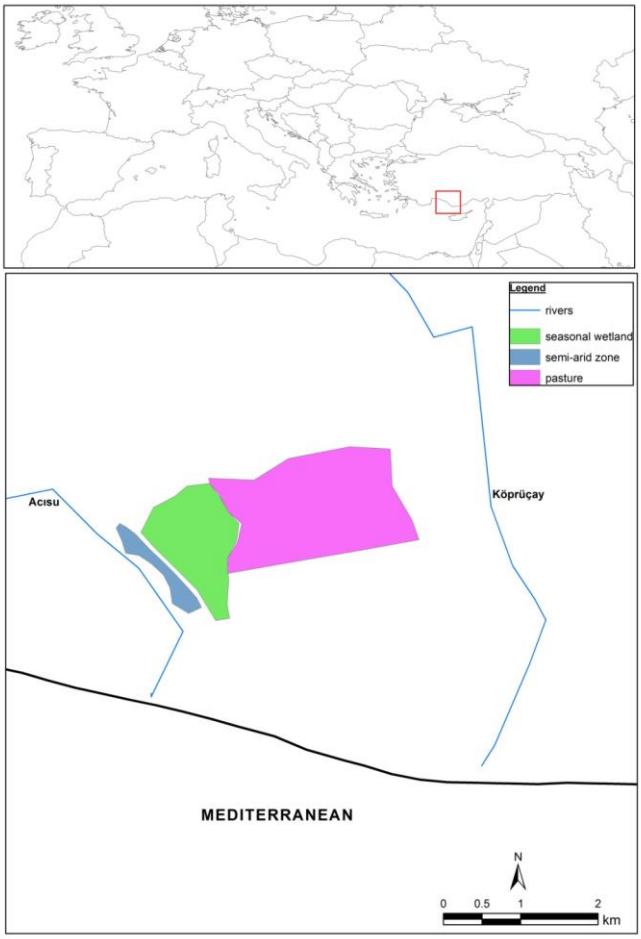

Figure 1. The basic map of the study area

We collected data every day in 2009 and 2010 spring migration periods. We captured five different wheatear species by using spring traps (Fig 2) baited with mealworm, *Tenebrio molitor*, (Fig 3), throughout the daylight period from the 1st of March to the 31st May both years. Ages and sexes of all birds were determined by plumage coloration, measured (maximum wing length to the nearest 0.5 mm according to Svensson (1992) and weighed to the nearest 0.1 g. Fat score was estimated on a nine-class (Kaiser, 1993) and size of the breast muscle on a four-class scale (Bairlein, 1994). Each bird was marked with an individual combination of one aluminium and split color-rings (Fig 4).

Figure 2. Spring traps

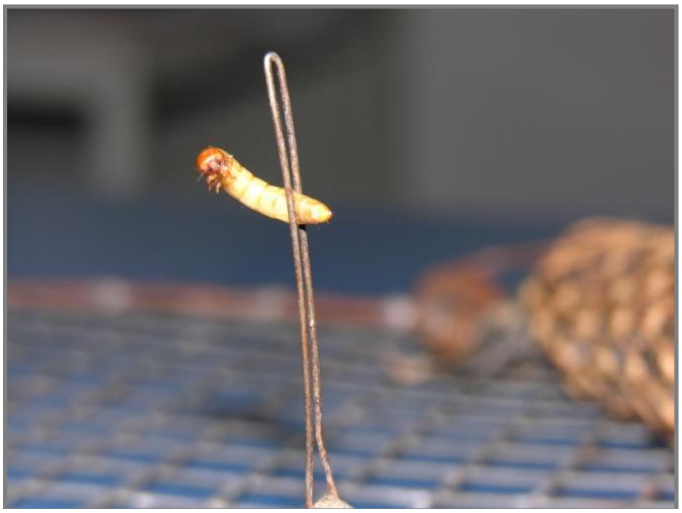

Figure 3. Mealworms (*Tenebrio mollitor*)

Results

In this study, we captured five different species of the genus *Oenanthe* in 2009 and 2010. These species were

Isabelline wheatear (*Oenanthe isabellina* (Temminck, 1829)), Northern wheatear (*Oenanthe oenanthe* (Linnaeus, 1758)), Black-eared wheatear (*Oenanthe hispanica* (Linnaeus, 1758)), Desert wheatear (*Oenanthe deserti* (Temminck, 1825)) and Finsch's wheatear (*Oenanthe finschii* (Heuglin, 1869)).

The most captured birds were Northern, Isabelline and Black-eared wheatears, respectively. Desert (6 birds) and Finsch's wheatears (only 1 individual) were captured only in 2009 at study site. Many individuals' stopover durations were determined by observation and feeding experiments. The number of individuals and stopover durations from each species are given in Table.

Figure 4. Aluminum and color ring combination of different individuals.

Spring Migration Phenology

According to the captured birds' data, Northern, Isabelline and Black-eared wheatears spring migration phenology were presented in graphics. There were not enough data for Desert wheatear and Finsch's wheatear.

Table. The number of captured birds, and the number of determined stopover durations of individuals of *Oenanthe* species in 2009 and 2010 spring seasons at Boğazkent (C: Captured, S: Sropover)

	Spring 2009		Spring 2010		Total	
Species	**C**	**S**	**C**	**S**	**C**	**S**
O. oenanthe	65	48	33	24	98	72
O. isabellina	43	15	18	14	61	29
O. hispanica	16	13	14	9	30	22
O. deserti	6	2	0	0	6	2
O. finschii	1	1	0	0	1	1
Total	**131**	**79**	**65**	**47**	**196**	**126**

Northern wheatear (*Oenanthe oenanthe*)

Northern wheatear was the most captured species with 65 birds in 2009 and 33 birds in 2010. Northern wheatear started to come in the second week of March and continued their migration to the end of April. During the spring migration, there were two peaks (end of March and second week of April), in that the number of migrants were high (Fig 5).

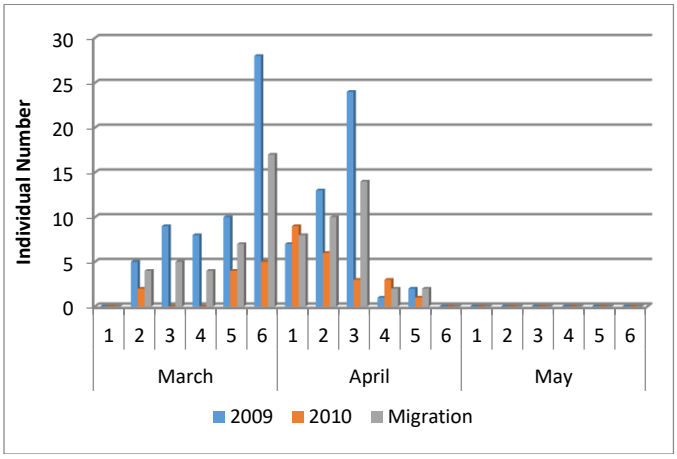

Figure 5. Migration phenology of *Oenanthe oenanthe* in spring

We captured 61 individuals (43 birds in 2009 and 18 birds in 2010) of the Isabelline. Similarly, it started to come studying area in the second week of March, but finished the beginning of April. The spring migration of the species had only one peak, that the number of the migrants had increased the second half of March and again decreased regularly to the beginning of April (Fig 6).

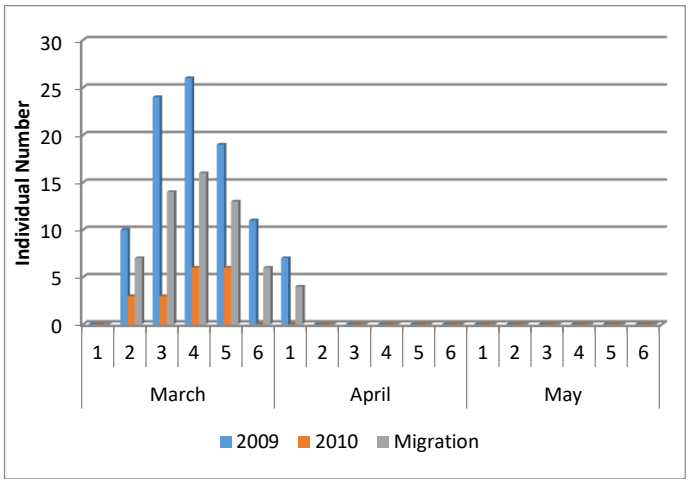

Figure 6. Migration phenology of *Oenanthe isabellina* in spring

Black-eared wheatear (*Oenanthe hispanica*)

Black-eared wheatear was the latest and the lowest wheatear species in study site. In 2009 and 2010, 16 birds and 14 birds were captured, respectively. It started to come at the end of March and continued their migration to the end of April. The spring migration of the species had only one peak, that the number of the migrants had increased the first week of April and again decreased regularly to the end of April (Fig 7).

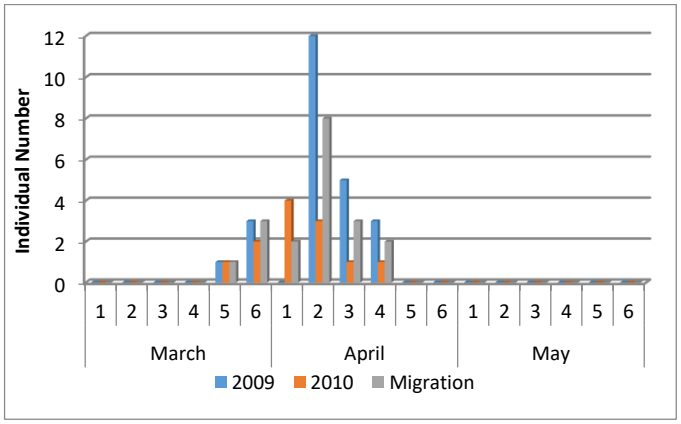

Figure 7. Migration phenology of *Oenanthe hispanica* in spring

In this study, 6 individuals of the Desert wheatear were captured only in March and only one individual of Finsch's wheatear in the second half of March.

Discussion

Migratory birds spend most of their time on stopover sites between breeding and wintering areas (Hedenström and Alerstam, 1997). Turkey has many important stopover sites for refueling across the north to the south or opposite way round. The Mediterranean Sea is one of the main ecological barriers of Eurasian breeding birds and the coastal line of the southern Turkey is the first step of many African migrants after passing this ecological barrier. Wheatear species are mostly Eurasian breeding birds and migrate to the Africa southern Sahara Desert for wintering.

The Northern wheatear is one of the species, which breed almost whole northern Holarctic, from Alaska to Siberia. Turkey is important way of Eurasian northern wheatears. In contrast, Isabelline and Black-eared wheatears have narrower breeding distribution. The numbers of captured birds (Table 1) show that more Northern wheatears use this site to stopover. Besides, the migration time length in spring migration is also longer than other two wheatear species. As the spring migration of the Northern wheatear at study site takes almost two months, Isabelline and Black-eared wheatears have almost one-month migrations in southern Turkey after passing the Mediterranean Sea (Figure 8).

On the other hand, timing of spring migration has differences between wheatear species. Northern and Isabelline wheatears start to come on the coast line of the study site at the beginning of March. On the contrary, the primary individuals of the Black-eared wheatear come to the end of March (Fig 8).

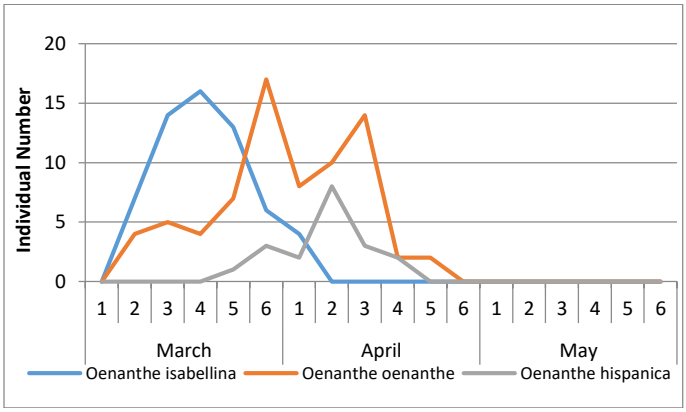

Figure 8. Comparison of the migration phenology of three *Oenanthe* species in spring

Isabelline wheatear (*Oenanthe isabellina*)

All these birds use the study site only for stopover, there was no observation of breeding pairs none of studied wheatear species. Many bird species need to spend some time for refueling in the coast line of the southern Turkey after passing the Mediterranean Sea as stopover. Previous studies at the same area from different species (Karaardıç et al., 2006; Karaardıç et al., 2008; Erdoğan et

al., 2008; Karaardıç et al., 2017; Karaardıç and Özkan, 2017) and with this work show once again the importance of all areas in the southern Turkey especially for migratory birds. All this knowledge could provide the correct management plans of areas against anthropogenic effects such as tourism and farmland use.

Acknowledgement

This study was supported by The Scientific Research Projects Coordination Unit of Akdeniz University with the Project No 2008.03.0121.014 and was a part of PhD thesis.

References

Alerstam T., Lindström A. 1990. Optimal Bird Migration: the relative importance of time, energy and safety. In: E. Gwinner (Ed.). Bird Migration: physiology and ecophysiology. pp: 331- 351.

Bairlein F. 1994. Manual of field methods. European-African Songbird Migration Network, Wilhelmshaven. 54 p.

Dirschke V., Delingat J. 2001. Stopover behaviour and departure decision of northern wheatear, Oenanthe oenanthe, facing different onward non-stop flight distances. Behavioral Ecology and Sociobiology, 50: 535-545.

Erdoğan A., Karaardıç H., Sert H., Özkan L., Vohwinkel R., Prünte W. 2008. Manavgat/Titreyengöl Kuş Halkalama Çalışması. Tabiat ve İnsan, 42(1639: 23-33. (in Turkish)

Hedenström A. 2008. Adaptations to migration in birds: behavioral strategies, morphology and scaling effects. Philosophical Transactions of the Royal Society London B, 363: 287-299.

Hedenström A., Alerstam T. 1997. Optimum fuel loads in migratory birds. Distinguishing between time and energy minimization. Journal of Theoretical Biology. 189: 227-234. Hedenström A., Alerstam T. 1998. How fast can birds migrate? Journal of Avian Biology, 29: 424-432.

Houston A. I. 1998. Models of optimal avian migration: state, time and predation. Journal of Avian Biology, 29: 395-404.

Kaiser A. 1993. A new Multi-category Classification of Subcutaneus Fat deposits of Songbirds. Journal of Field Ornithology, 64, 246-255.

Karaardıç H., Erdoğan A., Vohwinkel R., Prünte W. 2006. The relationship between biometry and migration time among nine species of warblers in southern Turkey. Journal of Ornithology, 147(5): 191.

Karaardıç H., Özkan L. 2017. Breeding and migratory distribution of Collared pratincole (*Glareola pratincola*) at Boğazkent, southern Turkey. Acta Biologica Turcica, 30(3): 74-78.

Karaardıç H., Özkan L., Erdoğan A. 2017. Antalya Boğazkent'in Göçmen Kuş türleri. Tabiat ve İnsan, 51(200): 40-48. (in Turkish)

Karaardıç H., Prünte W., Erdoğan A., Vohwinkel R. 2008. Silifke/Susanoğlu Sonbahar Halkalama Çalışması. Tabiat ve İnsan, 42(162): 25-31. (in Turkish)

McClintock C.P., Williams T.C., Teal C.M. 1978. Autumnal bird migration observed from ships in the western North Atlantic Ocean. Wilson Bulletin, 49: 262-277.

Newton, I. 2008. The Migration Ecology of Birds. San Diego, CA, USA, 985 pp.

Schmaljohann H., Becker P.J.J., Karaardıç H., Liechti F., Naef-Daenzer B., Grande C. 2011. Nocturnal exploratory flights, departure time, and direction in a migratory songbird. Journal of Ornithology, 152: 439-452.

Svensson L., 1992. Identification guide to European passerines. Stockholm. 367 p.

Totzke U., Bairlein F. 1998. The body mass cycle of the migratory garden warbler (*Sylvia borin*) is associated with changes of basal plasma metabolite levels. Comparative Biochemistry and Physiology, Part A, 121: 127-133.

Totzke U., Hubinger A., Bairlein F. 1997. A Role for Pancreatic Hormones in the Regulation of Autumnal Fat Deposition of the Garden Warbler (*Sylvia borin*)? General and Comparative Endocrinology, 107: 166-171.

Wikelski M., Tarlow E.M., Raim A., Diehl R.H., Larkin R.H., Visser G.H. 2003. Costs of migration in free-flying songbirds. Nature, 423: 704.