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Research Article

Features of the Common Myna in Green Areas of Almaty

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Abstract

Background and Objective: The common myna is native to southern Asia and has been found in Kazakhstan since 1961¹. This article aimed to determine the current state of the localization of the common myna (*Acridotheres tristis* L.) in urban areas. This bird quickly adapts to new environments and has become a real synanthropic species. Due to its adaptive assimilation, the myna, which is a new member of the urban ornithofauna, some of the birds found in the city began to displace. However, the number and location of *Acridotheres tristis* L. have not been specifically studied. **Materials and Methods:** Common mynas were studied in four green zones of Almaty City. The study was conducted in accordance with commonly accepted classical ornithological methodologies, including visual observations, e.g. with 30 min of observations in one location and a 5 min census on certain routes. A total of 109 h were spent in the above mentioned green zones. **Results:** Currently, common mynas are widespread in all areas of the city and the research areas and the distribution of the common myna was unevenly distorted and quantitatively variable. In addition to determining the number of birds that reside with common mynas and factors that threaten the safety of common mynas, the impacts of the species on the environment, including competition with other bird species, were studied. **Conclusion:** The common myna population in Almaty is healthy and these birds have quickly adapted to the moderate belt climate and are gradually spreading to the north. In addition, they are displacing local birds that reside in the cities of Kazakhstan.

Key words: Acclimatization, biotope, common myna, range, urbanization

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

The problem of conserving biodiversity is crucial worldwide. In Kazakhstan, specific research is underway to study the populations of plants^[1] and animals. One of the animals that require a population study is the common myna. There are many reports in the foreign²⁻⁵ and domestic literature⁶⁻¹⁴ about the common myna (*Acridotheres tristis* L., 1766). However, there are few data on this bird in Kazakhstan's inhabited localities, including the green areas in Almaty. In the twentieth century, the processes affecting the naturalization of wild animals have been studied and the ranges of some birds, including the common myna and other animals have expanded. The common myna was observed in the early 1960s (more precisely, in 1961 in Shymkent). Two hundred birds were brought to Almaty in late March 1962¹⁵.

In the early years after its introduction, the common myna was not observed in urban areas; however, at the end of summer and early autumn, young common myna were observed in central zoo parks, which indicates that their populations grew in rural areas. In 1964, nests were found in central zoo parks and hunting farms and in 1965, mynas were found in the botanical gardens. In the 1970s and 1980s, ravine-style nests of the common myna were found in many parts of the city and the myna gradually became a commonplace bird^{5,6,16}.

A sharp increase in the number of common myna juveniles in Almaty was observed from 1990-1999. During these periods, massive settlements of the species were formed⁷.

In 2000-2005, in the southern area of Almaty, in the "Kazakhfilm", "Orbita" and "Almagul" microdistricts and in Akademgorodok and Atakent, the common myna was one of the most prevalent birds in spring and summer, especially in private gardens. Such sightings were characteristic for many parts of the city and even in central locations^{8,9}.

In the summer months, along with the common myna, the densities of *Parus major* and *Columba livia* var. *domestica* were relatively normal and relatively high, respectively¹⁰.

In Almaty districts, data are not available on the location of the common myna, although its occurrence within the city changed dramatically in the twenty-first century with the construction of new buildings and roads. The common myna habitat has gradually become narrower. In this case, study of the specifications of the bird's activities can be considered a scientific practice. The dynamic processes of the bird belt of Kazakhstan and Central Asia have been affected by climatic and anthropogenic factors, especially in the last ten years

of the twentieth century and the first decade of the current century. Many new species have been introduced to nonnative areas, resulting in the elimination of some native and important bird species. During the period from 1995-2005, birds in the fauna of Almaty were subjected to a great deal of change and 223 species of birds were documented¹⁶. In 2008, 235 bird species were observed¹³. The number of bird species documented in urban areas was 53. In 2009, with reference to the ornithological census conducted by the Institute of Zoology¹³, researchers presented the frequency of different bird species observed by month in the East, South-West, West and North-West of Almaty (according to the results of the survey conducted in 2009¹⁴ and the average daily frequency of encountering *Acridotheres tristis* in Almaty was approximately 63-209 per hour).

The aim of this study was to determine the current state of the *Acridotheres tristis* L. which inhabits the green areas of Almaty, identify the location characteristics and determine the significance of the causes that contribute to the mortality of the myna in urban settings.

MATERIALS AND METHODS

Experimental site: The research was carried out in 2017-2018 in the green zones of Almaty-the General Botanical Garden, the Al-Farabi Kazakh National University campus, the Central Park of Culture and Recreation, the 28th-Panfilov Park, the boulevards of the city and the yards of the micro districts (Fig. 1).

Materials and research tools: Common mynas were studied in four green zones of Almaty city (Fig. 2). Binoculars (MINOX BV 10×42 BR and BERKUT-7 BPC 8×10 (USSR)), were used as tools to monitor the life of common mynas.

Research procedure: The study was conducted in accordance with commonly accepted ornithological methods from classical ornithological reports^{11,12,17}: visual observations were performed and consisted of 30 min of observation in one place and a 5 min census on certain routes. A total of 109 h were spent in the above mentioned green zones.

Parameters measured: The five-minute interval accounting method is a type of pedestrian observation. All birds, regardless of location, are taken into account and the results are recorded every five minutes. In this methodology, the observers record the birds they have seen during the first



Fig. 1: View of the green zones of almaty: (a) Botanical garden, (b) Al-Farabi KazNU campus, (c) General botanical garden and (d) 28th-Panfilov park

Source: <https://2gis.kz/almaty?queryState=center%2F76.916656%2C43.226193%2Fzoom%2F11>

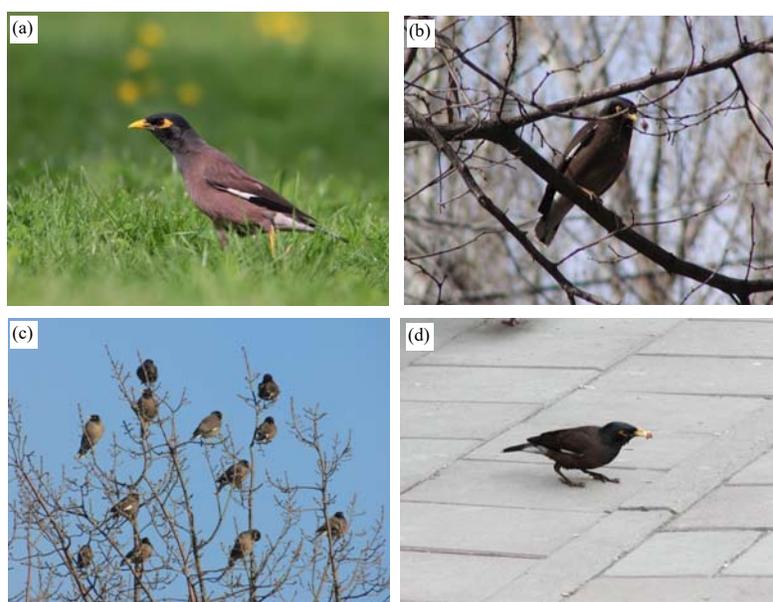


Fig. 2: Photographs of common myna taken in the green areas of almaty: (a) Botanical Garden, (b) Al-Farabi KazNU campus, (c) Central park and (d) 28th-Panfilov Park

5 min and then in the subsequent five minutes (6-10 min) separately. This approach allows for the production of an average score for every five minutes or 1 h.

Statistical analysis: Tables, graphic images and statistical analyses of the results were performed using the Excel program of the MS Office 2010 package.

Experimental design: Classifying the census results accurately based on the biotope and observation data for each person individually is vital to data analyses. In forests, there may be different biotopes, such as shrubs and birchy places. In this case, every five minutes, different landscapes were observed. In the first 5 min period, shrubs were observed, while in the second 5 min period, data from additional squares were

recorded. This approach yielded good results. For example, in 60 min, 60 birds in woodlands, including 23 squares and 15 shrubs, were found. This method was especially effective in places where people were likely to spend 15 min each day working or studying in 3-5 min increments and after a few observation periods, the data collection duration may add up to five minutes.

To obtain complete definitions, each group of identified birds must be separated by commas. For example, "Parus major 1, 1, 4". This process allows the observer to define the group size and average size. Once the calculation has been completed, the definitions are written down on one line and the accuracy of the data can be determined (how many cannabis weigh 10 in 1 h 120 species of sparrows).

This type of monitoring is more effective when investigating a particular species and accurate results are obtained when determining the number of species, decreases in the number and density of the species and the frequency at which the species is encountered. Even in an absolute census, an observer may use these definitions to determine the length of the route by considering the census and recounting of the whole area.

RESULTS AND DISCUSSION

During the analysis of the frequency of bird observations, a relative deviation was observed in the number of birds encountered in all the regions of Almaty and those observed seasonally. However, in our study, the average frequency of visits throughout the city was 121 per hour. Currently, the common myna is one of the major birds in the city and the population is rapidly growing after its introduction. A considerable number of common mynas are observed in summer and autumn, with an average of 107-209 sightings and a small number of sightings occurred in winter. In the winter months, the frequency of occurrence fluctuated between 63 and 109 individuals.

In some cases, the census revealed that their numbers were between 5 and 100. Common mynas were often found in smaller groups from 3-7 to 20 individuals (Fig. 3).

According to the results of the study carried out in the green areas of Almaty, i.e., the General Botanical Garden, Al-Farabi KazNU campus, Central Park, 28th-Panfilov Park, boulevards of the city and courtyards in micro districts, the common myna are unevenly distributed in Almaty.

A comparison of winter with summer and autumn showed that the number of common myna is approximately 2 times less in winter; thus, its frequency depends on climatic factors, which affect their activity because they migrated

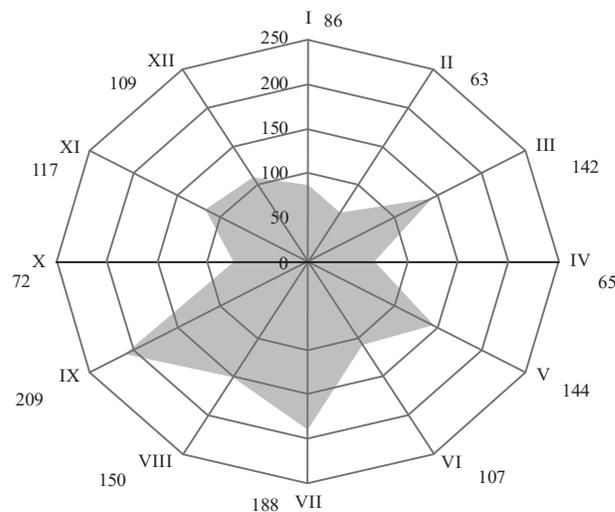


Fig. 3: Frequency of encountering the common myna in the year 2009

from the south. Therefore, as noted above, the count of 1-20 individuals during the census shows that our results are correct. Over the study period, the number of common mynas was quite different from previous years. The numbers of common mynas was unstable annually and depending on the climatic conditions of the year.

We found significant distribution patterns across Almaty city that indicated limited levels of effective dispersal among the populations. In our article, 54 species were investigated in the green zones of Almaty. Among these species, certain birds have dominant indices, such as the house sparrow *Passer domesticus*, common myna *Acridotheres tristis*, rock dove *Columba livia*, rook *Corvus frugilegus* and great tit *Parus major*. Collectively, these birds accounted for 82.73% of the observed species. The percentage of these species in the census was as follows: house sparrows, 30.6%; common myna, 8.9%; rock dove, 26.7%; rook, 7.2% and great tit, 9.4% (Fig. 4). According to the results of the survey, the number of poultry species in the city was increased, with the maximum observed in winter months up to February. The accumulation of birds in the city in winter was explained by the movement of these species from the surrounding areas to the territory of the city, where it is easier to find food. In March, their numbers fell when they started breeding and were distributed among nesting sites. The increase in numbers in August and September is due to the appearance of young birds after the nesting period; in October, poultry farming occurs; in November, most of the birds leave the city and are distributed over farmland, where they feed on grapes, orchards and other crops and in December, they begin to return to the city again.

Table 1: Frequency of encountering the common myna in the green zone of the city of Almaty, ha

Area	Spring	Summer	Autumn	Winter	Average
General botanical garden	7-24	13-23	8-12	5-9	11
Al-Farabi KazNU campus	8-13	7-19	4-10	2-6	9
28th-Panfilov park	1-6	2-12	2-6	1-4	5
Central park	2-22	8-28	7-9	2-6	9
City streets	2-11	2-9	1-4	2-8	4
		5	3	2	5

Fractional deviation is considered in the fractional fraction and the mean value in the section

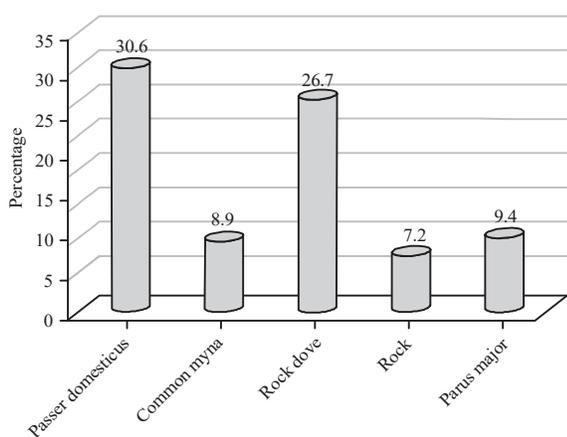


Fig. 4: Abundance of birds found in all regions of Almaty

As shown in Fig. 4, the reason why a great number of birds are found in the city area is because they are from wind, cold and the predatory birds and abundant food is available. House sparrow and rock dove are dominant (30.6 and 26.7%) in the city because they are not protected by the dangers from people in suburban areas and construct nests in buildings. A low number of common myna, rooks and great tit are observed in urban areas because of their high protective capabilities.

The number of common mynas was recorded hourly, with an average of 12 birds per hour in the spring, 18 birds per hour in the summer, 9 birds per hour in the autumn and in the winter, 6 birds per hour in the General Botanical Garden In the Al-Farabi KazNU campus during the current year, the frequency of the common myna was 10 birds per hour in the spring, 15 birds per hour in the summer, 7 birds per hour in the autumn and 4 birds per hour in the winter.

According to the route census, in the 28th-Panfilov Park, the frequency of common myna in the spring was 4 birds per hour, in the summer was 8 birds per hour, in the autumn was 5 birds per hour and in the winter was 3 birds per hour (Table 1).

An analysis of the data in Table 1 shows that common mynas are often found as synanthropic bird species but in relatively small numbers in areas where there is less human activity.

Disturbance is the main factor for the distribution of birds in the metropolitan area, including common mynas. Our research has shown that common myna is synanthropic, although it is concentrated in areas where there are fewer people. For example, the general botanical garden is a specially protected area and vacationers will only be available for a certain period of time, which is why the number of birds is much higher (Table 1). In Al-Farabi KazNU campus, there are many students in the campus, although disturbance is not significant because students do not walk on green area. In the central park, secure locations are plentiful. In the 28th-Panfilov Park, the disturbance factor is very high because the site hosts a church, many restaurants and cafeterias and many visitors. The streets of the city, especially the yards, have cats, dogs and fewer vacancies. Therefore, the number of common mynas is lower relative to the other three urban locations (Table 1).

The results of the census to determine the number of common mynas in 2017-2018 have been largely reliable. In recent years, a significant decrease has been observed in the number of common mynas in the city. On the other hand, the numbers of house sparrow and Eurasian blackbird have increased. Thus, regular monitoring of the number of birds in Almaty City is required.

The number of birds in the central park is considerably variable. In the green zone, there were an average of 10 birds per hour in the spring, 16 birds per hour in the summer, 7 birds per hour in the autumn and 4 birds per hour in the winter.

Control data collected in the streets and courtyards of the city have shown that this bird's frequency is different. In the spring months, the mean frequency per hour is 5 and in the summer months, this number is between 4 and 6 (Fig. 5).

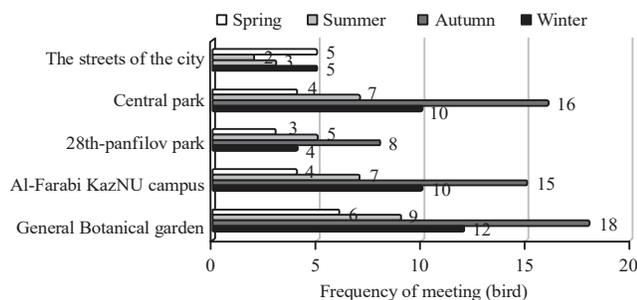


Fig. 5: Average frequency of common myna cycles with season

According to the above mentioned observations, the tendency of the common myna in all seasons remains moderate. The average frequency of common myna occurrence varied between 4 and 11 birds (Fig. 6).

The continuation of the expansion of the range of the common myna in Kazakhstan, including the green areas of Almaty and surrounding settlements, remains a topic of debate among ornithologists, ecologists and the public.

For many years, common mynas have extended the ranges of their native and localized areas and their increase in density and overall population size may be associated with human activities. Under our monitoring scheme, the common myna was rarely found in natural areas that were far away from human settlement. However, there are no specific empirical data and statistical data available for this species.

Comparatively, the number of common mynas was significantly higher in the green sectors of the city as well as in the courtyards of many multistory houses.

The results of the observations show that the common myna is now widely spread throughout the city and in the regions where this research was carried out, the distribution of the species is uneven, with the number varying according to the month and season.

From a biogeographic point of view, urban areas are an interesting topic and current subject of research. We are convinced that this information will encourage future research on invasive species, including sarin.

Moreover, the number of common myna habitats in urban areas such as Almaty can be disruptive depending on the season and the population is concentrated in areas that are less sensitive. This bird's adaptive behavior to new climatic zones is unknown. Thus, in the future, it is necessary to conduct regular monitoring of this species and its behavioral characteristics.

At the end of the 20th century, the common myna spread to the north zone, including the north of Betpakdala and Lake Balkhash^{6,18}, the east of Ayagoz¹⁹ and Bukhtarma

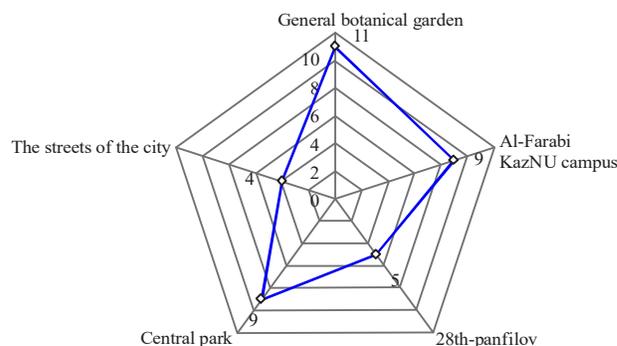


Fig. 6: Average common myna frequency in the green spaces of the city (birds)

reservoir²⁰ In the next 20-30 years, we expect that its number in southeast of Kazakhstan will be the same as the current number in Almaty City. A famous orientalist²¹ indicated that this bird is currently in the southeastern region and has a sizeable population. In the east of Kazakhstan, it is only occasionally observed, whereas in Central Kazakhstan, it is one of the few birds that nest, although the size of the population is too small²¹. The intensive knowledge of the northern territory of the common myna in the above mentioned regions (eastern and central) in the second half of the 21st century is unavoidable and it may represent a seasonal birds. In the past 50 years, the common myna has extended north by 1000-1200 km. This bird has quickly adapted to new conditions, which will likely be affected by global climate warming.

Currently, the common myna is not found in the southwestern, western and northern regions of Kazakhstan²¹. In our opinion, although the common myna will not reach the far east regions in the future, the climate to the southwest will warm, which will attract the bird.

In green areas of Almaty, common myna gradually acquires its own territory and is far from the first territory^{15,22}. Moreover, its adaptation to new environments is gradual. After its localization in Almaty in 1962, this bird appeared in 1965 on the territory of the general botanical gardens in the center of the city. The number and frequency of the species may depend on the green plantings in the district, which depend on the season²². According to these studies, common myna were not observed in the 28-Guards Panfilov Park or the Baum grove. In our opinion, the common myna should not have occupied these places from 1984-1986. During our research (2014-2018), the common myna was one of the most widespread and dominant birds in all parts of Almaty.

Information on the common myna are inconsistent²³. Grape gardens are not observed in Almaty and the surrounding areas. Other birds and pigeons likely have not been evicted from their habitat. Barn swallows, common starlings, house sparrows are common in urban areas. However, their numbers have been reduced in the city because of the construction of high-rise concrete structures, processing of wood-gardens and orchards and various chemicals. Common mynas are migratory birds and their number changes based on seasonal and climatic conditions. In recent years (2017-2019), the number of sparrows and pigeons has been significantly declined in the city.

Common myna is a bird that imitates different sounds and is very bold. Research on the etiology of this bird is insignificant. Therefore, any information about this synanthropic bird is very valuable. To determine its distribution and economic and aesthetic significance, young naturalists and birdwatchers should create a special program for these works.

Research carried out in 2017-2018 shows that the common myna is well adapted to survive in urban settings as a synanthropic species. In particular:

- The results show that the common myna is now widely spread throughout the city
- In the case of a large metropolis, such as Almaty, the location and quantity of birds in the various zones depends on the effects of various abiotic and anthropogenic factors, including seasonal effects
- In the research area, the distribution of the common myna is uneven and the number varies from year to year. For example, in the territory of the botanical gardens, an average of 6-18 birds per hour per season was observed and in the 28th-Panfilov Gardens, 3-8 birds per hour per season were observed. In the Central Park of Culture and Recreation, 4-16 birds per hour per season were observed, while 2-6 birds per hour per season were observed in city streets and yards.
- The proportion of common myna is significantly higher in the green sectors of the city
- In recent years, large groups of common mynas have appeared. They are abundant and easily observable from long distances. In this regard, the common myna is one of the dominant species in the city and other localities

CONCLUSION

Common mynas present a healthy population in Almaty and they are quickly adapting to the moderate belt climate

and gradually spreading to the north. In addition, they are displacing the local birds residing in the cities of Kazakhstan.

SIGNIFICANCE STATEMENT

This study has revealed that common mynas are adapting to a new environment that can be beneficial for biodiversity assessment. This study will help researchers to explore the current state of new migratory species that many researchers were previously unable to explore. The condition of the common mynas in Kazakhstan cities is being studied for the first time. Thus, a new theory on these migrating new species and their competitiveness in other environments may be developed.

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