



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(1): 1347-1351

© 2018 JEZS

Received: 05-11-2017

Accepted: 06-12-2017

Taghiyev AN

Baku State University,

Baku, Azerbaijan

## The species composition and trophic relationship of sedentary bird populations at wintering period in Gyzylagaj bay and adjacent terrestrial areas, Azerbaijan

Taghiyev AN

### Abstract

The species and trophic relations of sedentary bird populations wintering in Gyzylagaj bay and adjacent lands have been investigated in 2005-2017. It was recorded sedentary bird populations belonging to 13 orders, 30 families, 47 genus and 64 species. The diet of 45,3% of them contains animal food (29 species), of 48,4% - both animal and floral food (31 species) and 6.2% only vegetal food (4 species). The food ration of 42 bird species contains water invertebrates, of 43 species - terrestrial invertebrates, of 16 species - fishes, of 7 species - amphibians, of 10 species - reptiles, of 11 species - birds, and of 10 species - mammals. The diet of 35 bird species contains seeds of plants, of 21 species vegetative parts of plants, and of 10 species – fruits.

**Keywords:** Trophic, wintering, sedentary, biodiversity

### Introduction

In 2000 the Strategy and Action Plan for Conservation and Sustainable Use of Biodiversity, in 2010 “Gabala declaration” on Conservation of Biodiversity have been signed in Azerbaijan. The president of Azerbaijan has also signed the order on “Conservation of Biodiversity and Genetic Fond” on 21 December 2002 <sup>[1, 2]</sup>.

It is impossible to characterize the life of animals before knowing the importance of the food resources in their life. Exchange of matters in ecosystems, energy and information flow is only possible in a complex network of interspecific interactions. The strength and quality of interspecific food character provides the necessary level of integrity and completeness of biocenosis.

The Gyzylagaj bay and adjacent lands are especially important areas for investigation of the species composition, settlement level, interspecific and intraspecific and trophic interactions of wintering bird populations in Azerbaijan. The species composition, settlement level and trophic relations of wintering bird populations are almost not studied yet. However, this area has always been affected by natural (fluctuations of sea level), antropic and antropogenic factors. Trophic relations are important factors in settlements and migration of birds <sup>[19, 20]</sup>. During the wintering period the species composition, settlement level and trophic relations depend on quantity and quality of their food resources <sup>[3]</sup>. Because food resources can change during the day depending on air temperature. That is why the species composition, settlement level and trophic relations of birds in wintering period have been investigated many years. The settlement of bird populations of the same species in different biotopes and their trophic relationship was considered by us <sup>[9]</sup>.

### Material and methods

The investigations have been carried out in 2005-2017 on transects by using also horses, vehicles, motorized and ordinary boats. The main goal was to study the species composition, settlement level and trophic relations of wintering sedentary bird populations. Investigations have been carried out every year in December, January and February from 9<sup>00</sup> to 17<sup>00</sup>, sometimes even in night hours. For observation of birds binoculars and Carl Zeiss telescope were used. In 2005-2010 the professors and students of Vertebrates’ Zoology, High Plants’ Systematics and Biogeography department of Moscow State University have also participated

Correspondence

Taghiyev AN

Baku State University,

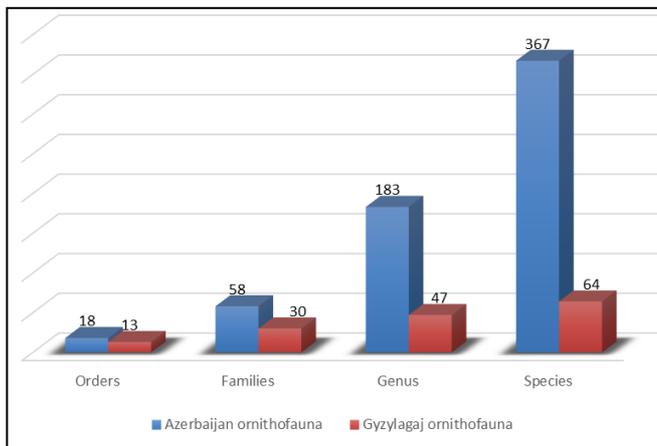
Baku, Azerbaijan

in investigations. The trophic relationship of wintering birds have been studied by analyzing their food remnants, excrements, emesis in their feeding, resting and overnighting grounds by direct visual observations and based on scientific literature. The difference in importance of these methods for different bird groups, color and smell, more or less deformation of food remnants have been considered. Evaluation of food remnants have been carried out on fodder scale of G.T. Mustafayev and N.A. Sadygova [5, 6].

Investigation of food characteristics of owls and seagulls was done on their vomits. Different individuals of the same bird species from populations of sedentary wintering and birds coming to winter can get food from different places, and it is adaptation for increasing of life effect, which has reversible character.

## Results and their discussion

The species composition, settlement level, trophic relations of wintering sedentary birds in Gyzylagaj bay and surrounding lands are not conditioned by only species diversity, but also with abundance of food (amount of food per area unit), its stability, yearly, daily and biotopically differences, availability. Sometimes, when even the food is abundant, the other negative factors (freezing of water, solid fog, frosts, strong winds, rain etc) change the character of feeding of birds during the day. The abundance of food resources influences not only species composition, settlement and density of bird populations, but also their feeding characteristics. The main food of sedentary birds wintering in these areas are animal, vegetable and mixed feeds [diagram 2].

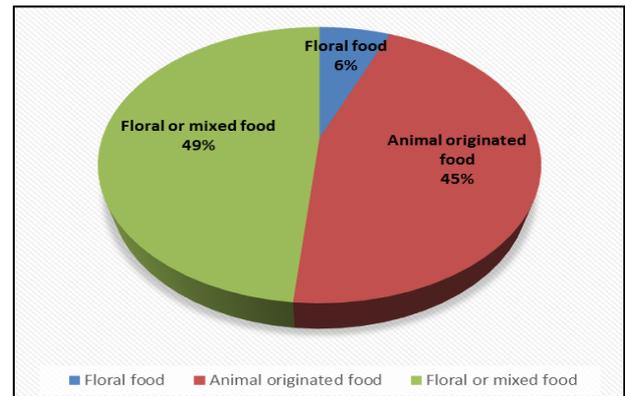


**Diagram 1:** The taxonomic comparison between Azerbaijan ornithofauna and bird populations of Gyzylagaj bay and adjacent terrestrial areas

When comparing the species composition of 64 bird species coming to winter in Gyzylagaj bay and adjacent lands and 367 species of birds recorded in Azerbaijan [4] the number decreases from order to species levels (77.7% - 40.3%) [diagram 1] [7].

This study was not carried out on purpose by any scientist in Gyzylagaj bay and surrounding lands before. In 1960-1980 G.T. Mustafayev, K.M. Qambarov, A.I. Khanmamedov, N.I. Burchak-Abramovich, I.R. Babayev [4], D.G. Tuayev, V.S. Grekov, N.A. Qladkov, B.S. Zaletayev [21] investigated distribution and trophic relations of some bird species. Kabich K and Belther H. (1967-1968) for the first time in Europe studied trophic relations of birds and amphibians, reptiles. Nechayev V.A., Korotkov Y.M. [21] investigated trophic relations between birds and amphibians, reptiles in Primorye and Priamurye. H.C. Atamac and Lopatev [21] studied trophic relations of *Larus cachinnaans*, C.A. Ekimov [4] –trophic

relations of Strigidas, O.A. Shmyakina – trophic relations of birds in natural and anthropogenic conditions, M.K. Rijov [21] - trophic relations between birds and amphibians, reptiles in Mordoviya republic. We carried out investigations on population level of birds distributed in this area by using methods accepted in ornithology



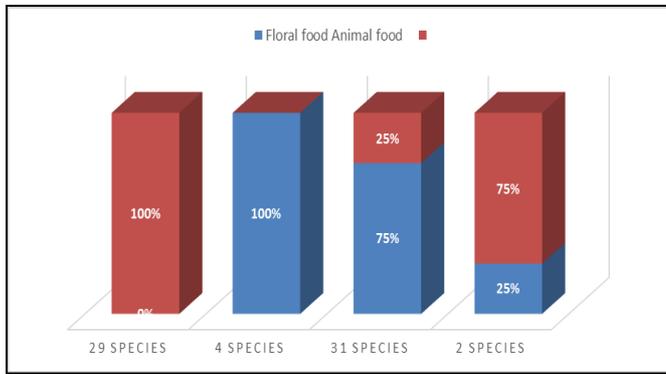
**Diagram 2:** Feed character of wintering sedentary bird populations of Gyzylagaj bay and adjacent terrestrial areas

In winter period in Gyzylagaj bay and surrounding lands the 75% of *Podiceps ruficollis*, *P.nigricollis*, *P.cristatus* diet contains water plants, and more than 25% contains water invertebrates. It was mainly recorded in Lesser Gyzylagaj bay, in channels connecting Lesser and Greater Gyzylagaj bays (Emergency, Fishpass, Spawning channels). *Palocrocorax carbo* *Ph.pygmaeus* feed on water invertebrates and fishes (~100%). *Botarus stellaris*, *Nycticorax nycticorax*, *Egretta alba*, *E. garzetta*, *Ardea cinerea*, *Ciconia ciconia* feed on water and terrestrial invertebrates, fishes, some terrestrial vertebrates (~100%). *Phoenicopterus roseus* ~75% feeds on floral, ~25% on animal food; *Tadorna ferruginea*, *T.tadorna* ~75% feed on vegetable food, and ~25% on animal food. *Anas platyrhynchos*, *A.strepera*, *Netta rufina* ~75% consume water plants, and ~25% water invertebrates and mixed food. The diet of *Circus aeruginosus*, *Accipiter nisus*, *Buteo buteo*, *Haliaeetus albicilla*, *Falco tinnunculus* (~100%) contains different species of vertebrates, of *Francolinus francolinus* mainly (~100%) floral food. *Rallus aquaticus* feeds ~100% animal food. *Gallinula chloropus*'d diet ~75% consists of floral, and ~25% of animal food, *Porphyrio porphyrio*, *Fulica atra* ~100% feed on green food, *Vanellus vanellus*, *Recurvirostra avocetta*, *Tringa ochropus* ~100% animal food. The diet of *Tringa ochropusun* ~75% contains floral and ~25% water and terrestrial invertebrates; *Tringa totanus* food is ~75% vegetal, and ~25% are water and terrestrial invertebrates. *Larus ichtyaetus*, *L.ridibundus*, *L.genei* feed on (~100%) animal food, *Pterocles orientalis*, *Columba livia* ~100% floral food. *Asio flammeus*, *Atene noctua*, *Alcedo attis* food is ~100% floral, but food of *Galerida cristata*, *Calandrella cinerea*, *Melanocorypha calandra* is ~75% vegetal and ~25% animal originated; *Motasilla flava*, *M.alba* ~100% fedd on animal food. The diet of *Sturnus vulgaris* is ~75% vegetal, and ~25% animal originated; *Garrulus glandarius* feed on ~75% floral, and ~25% animal food. The diet of *Pica pica*, *Corvus cornix* is ~25% plants, and ~75% animals; *Turdus merula*, *Corvus frugilegus*, *Cettia cetti*, *Panurus biarmicus* ~75% feed on plants, and ~25% on animals. *Remiz pendulinus*, *R.macronyx* ~100% eat water and terrestrial invertebrates; *Parus major*, *Sitta europea*, *S.neumayer*, *Passer domesticus*, *P. hispaniolensis*, *P. montanus*, *Carduelis carduelis*, *Emberiza calandra*, *E. schoniculus* prefer ~75% plants, and ~25% animal food [8, 9].

**Table 1:** The species composition and nutrition characteristic of wintering sedentary birds in Gyzylagaj bay and surrounding lands

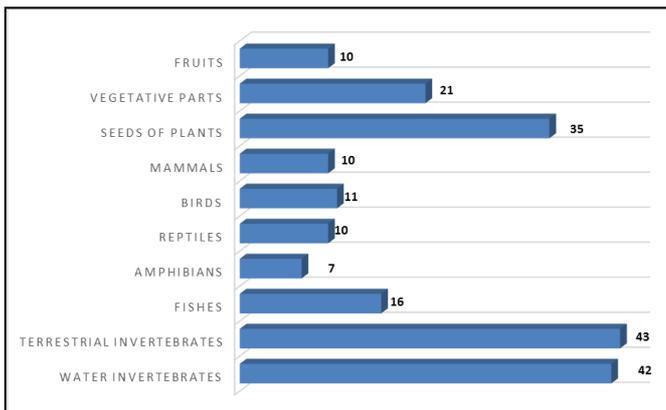
	Species	Floral food			Animal food						Food (~%)		
		S	F	V	W. inv	T. inv	F	A	R	B	M	B-m	H-m
1	<i>Podiceps ruficollis</i>	+			+							75	25
2	<i>Podiceps nigricollis</i>	+			+							75	25
3	<i>Podiceps cristatus</i>	+	+	+								75	25
4	<i>Phalacrocorax carbo</i>				+		+					-	100
5	<i>Phalacrocorax pygmaeus</i>				+		+					-	100
6	<i>Botarus stellaris</i>				+	+	+	+	+		+	-	100
7	<i>Nycticorax nycticorax</i>				+	+	+	+				-	100
8	<i>Egretta alba</i>				+	+	+	+	+	+	+	-	100
9	<i>Egretta garzetta</i>				+	+	+	+				-	100
10	<i>Ardea cinerea</i>				+	+	+	+	+			-	100
11	<i>Ciconia ciconia</i>				+	+	+	+	+	+		-	100
12	<i>Phoenicopterus roseus</i>	+			+							75	25
13	<i>Tadorna ferruginea</i>	+	+	+	+	+						75	25
14	<i>Tadorna tadorna</i>	+	+	+	+	+						75	25
15	<i>Anas platyrhynchos</i>	+	+	+	+							75	25
16	<i>Anas strepera</i>	+	+	+	+							75	25
17	<i>Netta rufina</i>	+		+	+							75	25
18	<i>Circus aeruginosus</i>					+	+	+	+	+	+	-	100
19	<i>Accipiter nisus</i>								+	+	+	-	100
20	<i>Buteo buteo</i>									+	+	-	100
21	<i>Haliaetus albicilla</i>						+			+	+	-	100
22	<i>Falco tinnunculus</i>						+			+	+	-	100
23	<i>Francolinus francolinus</i>	+		+		+						-	100
24	<i>Rallus aquatilis</i>				+	+						-	100
25	<i>Gallinula chloropus</i>	+	+		+	+						75	25
26	<i>Porphyrio porphyrio</i>	+	+									100	-
27	<i>Fulica atra</i>	+	+		+							100	-
28	<i>Vanellus vanellus</i>				+	+						-	100
29	<i>Recurvirostra avocetta</i>				+							-	100
30	<i>Tringa ochropus</i>				+	+						-	100
31	<i>Tringa totanus</i>	+			+	+						75	25
32	<i>Larus ichthyetus</i>				+	+	+		+	+		-	100
33	<i>Larus ridibundus</i>				+		+					-	100
34	<i>Larus genei</i>				+	+	+					-	100
35	<i>Larus argentatus</i>				+	+	+		+	+		-	100
36	<i>Pterocles orientalis</i>	+										100	-
37	<i>Columba livia</i>	+										100	-
38	<i>Asio flammeus</i>										+	-	100
39	<i>Athene noctua</i>									+	+	-	100
40	<i>Alcedo atthis</i>				+		+					-	100
41	<i>Galerida cristata</i>	+			+	+						75	25
42	<i>Calandrella cinerea</i>	+			+	+						75	25
43	<i>Melanocorypha calandra</i>	+				+						75	25
44	<i>Motacilla flava</i>				+	+						-	100
45	<i>Motacilla alba</i>				+	+						-	100
46	<i>Sturnus vulgaris</i>	+		+	+	+						75	25
47	<i>Garrulus glandarius</i>	+	+	+		+				+	+	75	25
48	<i>Pica pica</i>	+		+	+	+						25	75
49	<i>Corvus frugilegus</i>	+	+	+	+	+						75	25
50	<i>Corvus cornix</i>	+		+	+	+						25	75
51	<i>Cettia cetti</i>					+	+					75	25
52	<i>Turdus merula</i>	+		+	+	+						75	25
53	<i>Panurus biarmicus</i>	+			+	+						75	25
54	<i>Remiz pendulinus</i>				+	+						-	100
55	<i>Remiz macronyx</i>				+	+						-	100
56	<i>Parus major</i>	+		+		+						75	25
57	<i>Sitta europea</i>	+		+		+						75	25
58	<i>Sitta neumayer</i>	+			+	+						75	25
59	<i>Passer domesticus</i>	+		+		+						75	25
60	<i>Passer hispaniolensis</i>	+		+		+						75	25
61	<i>Passer montanus</i>	+		+		+						75	25
62	<i>Carduelis carduelis</i>	+		+		+						75	25
63	<i>Emberiza calandra</i>	+		+		+						75	25
64	<i>Emberiza schoeniclus</i>	+		+		+						75	25

**Note:** S-seeds, F-fruits, V- vegetative parts, W. inv- water invertebrates, T.inv- terrestrial invertebrates, F- fishes, A-amphibians, R- reptiles, B- birds, M- mammals



**Diagram 3:** The percentage of floral and animal originated food in a diet of wintering sedentary bird populations (~%)

4 species of birds (*Porphyrio porphyrio*, *Fulica atra*, *Pterocles orientalis*, *Columba livia*.) in Gyzylagaj bay and surrounding lands (~100%) mainly feed on floral food, and 29 species (*Phalacrocorax carbo*, *Phalacrocorax pygmaeus*, *Botarus stellaris*, *Nycticorax nycticorax*, *Egretta alba*, *Egretta garzetta*, *Ardea cinerea*, *Ciconia ciconia*, *Circus aeruginosus*, *Accipiter nisus*, *Buteo buteo*, *Haliastur albicilla*, *Falco tinnunculus*, *Francoelinus francoelinus*, *Rallus aquatus*, *Vanellus vanellus*, *Recurvirostra avocetta*, *Tringa ochropus*, *Larus ichthyetus*, *Larus ridibundus*, *Larus genei*, *Larus argentatus*, *Asio flammeus*, *Athene noctua*, *Alcedo atthis*, *Motacilla flava*, *Motacilla alba*, *Remiz pendulinus*, *Remiz macronyx*) (~100%) feed on animal originated food [diagram 3]



**Diagram 4:** The diet composition of wintering sedentary bird population in Gyzylagaj bay and adjacent terrestrial areas

31 species of birds (*Podiceps ruficollis*, *P.nigricollis*, *P.cristatus*, *Phoenicopterus roseus*, *Tadorna ferruginea*, *T.tadorna*, *Anas platyrhynchos*, *A.strepera*, *Netta rufina*, *Gallinula chloropus*, *Tringa totanus*, *Galerida cristata*, *Calandrella cinerea*, *Melanocorypha calandra*, *Sturnus vulgaris*, *Garullus glandarius*, *Pica pica*, *Corvus frugilegus*, *C.cornix*, *Cettia cetti*, *Turdus merula*, *Panurus biarmicus*, *Parus major*, *Sitta europaea*, *Sitta neumayer*, *Passer domesticus*, *Passer hispaniolensis*, *Passer montanus*, *Carduelis carduelis*, *Emberiza calandra*, *Emberiza schoeniclus*) feed on floral or mixed food. The percentage of floral or animal originated food in a diet of wintering birds varies depending on air temperature and availability of food [18].

The food ration of 42 bird species wintering in Gyzylagaj and surrounding lands contains water invertebrates, of 43 species - terrestrial invertebrates, of 16 species - fishes, of 7 species - amphibians, of 10 species - reptiles, of 11 species - birds, and of 10 species – mammals. Predominance of water and

terrestrial invertebrates is associated with abundance of these species in biocenosis and being easily available fodder for birds. The diet of 35 bird species contains seeds of plants, of 21 species - vegetative parts of plants, and of 10 species – fruits [diagram 4]

### Acknowledgements

We are very grateful to the administration of Gyzylagaj reserve, professors of Moscow University, Karl University of Check Republic and Baku State University for all support.

### References

1. A set of laws on the environment issues of Azerbaijan republic / by edition of H.S. Baghirov. Bakı: El – Alliance, 2002; I:404. in Az.
2. A set of laws on the environment issues of Azerbaijan republic / by edition of H.S. Baghirov. Bakı: El – Alliance, 2002; II:424 in Az.
3. Mustafayev GT. The ecological analysis parameters of vertebrate animals in terrestrial areas. Proceedings of the I Congress of Azerbaijan Zoologists Society. Bakı: Elm, 2003, 466-470. in Az.
4. Mustafayev GT, Sadygova NA. Birds of Azerbaijan. Bakı: “Çaşıoğlu 2005, 419.
5. Mustafayev GT, Sadygova NA. The ecological groups of birds composed by their nutrition in nature // Proceedings of the republicwide scientific conference on the topic “The actual problems of biology in XX1 century”. Bakı: BDU, 2010; 126-132. in Az.
6. Mustafayev GT, Sadyqova NA. Ecology of Vertebrate Animals (the textbook for universities) Bakı. 2011, 344. in Az.
7. Taghiyev AN. The taxonomic spectrum and protection of birds wintering on s-w coasts of the Caspian Sea. Works of the Institute of Zoology, 2014; 32(2):122-128. in Az.
8. Taghiyev AN. The nutrition characteristics of bird populations coming to winter on s-w coasts of the Caspian Sea. News of Baku State University. The Nature Sciences series. 2016; 1:78-84. in Az.
9. Taghiyev AN. The use forms of biotopes by wintering birds on west coast of South Caspian. News of Baku State University. The Nature Sciences 2016; 1:57-62. in Az.
10. Тагиев АН. Трофические связи и динамика численности рыбоядных птиц в Кызыл-агачском заливе Каспийского моря. Министерство образования и науки РФ ГОУ ВПО «Дагестанский государственный педагогический университет» Биолого-Химический факультет. Материалы докладов Международной научно-практической конференции. Современные проблемы биологии и экологии 10-12 марта 2011 г. Посвящается 70-летию со дня рождения д.б.н., профессора, заслуженного деятеля науки РФ Шейха Ибрагимовича Исмаилова. Махачкала 2011, 206-208
11. Гришанов Д.Г. Фауна, экология и охрана птиц водно-болотных угодий Калининградской области: Автореф. дис. канд. биол. наук. – Калининград, 2005, 23.
12. Конвенция о водно-болотных угодьях, имеющих международное значение, главнш образом в качестве местобитания водоплавающих птиц (Рамсар) // Свод нормативных актов ЮНЕСКО. – М.; Международные отношения, 1991, 191-199
13. Конвенция о биологическом разнообразии (Заклучена в 2. Рио-де-Жанейро 05.06.1992)//

- Бюллетень мепсдународных договоров. 1996; 9:3-28
14. Кривенко В.Г. Водоплавающие птицы и их охрана. – Б, 1991, 271.
  15. Линьков АБ. Биология размножения, территориальные связи и охрана возных и онолнводных птиц (на приммере Центрального Предкавказья): Автореф.дис.канд.биол.наук. М., 1989, 17.
  16. Нерекон ВВ. Развитие концепции ектононь и ихроль в сахранении биологического разнообразия // Уснехи современной биологии. – М.; Наука, 2001, - Т.121, №4,- С. 323-337
  17. BaldiA/ Effects of reedbed edges on destrbution of birds^ The role of microclimate, vegetation structure and predation.// Octrich. 1998; 69(3, 4):277
  18. Sadigova NA, Mustafayev GT, Tagiyev AH. Dynamics of the population distribution of birds on the Western coast of the Azerbaijan sector of the Caspian sea. Association of the Universities of the pre-Caspian countries. The Caspian sea, Natural resources International Journal. Published by: Baku State University No.4, Baku, 2010, 30-39
  19. Lee JJ, Tietjen JH, Mastropaolo C, Rubin H. Food quality and the heterogeneous spatial distribution of meifauna // Helgoland. Wiss. Meeresuntersuch. 1977; 30(1-4):272-282.
  20. Carney RS. Examing relationships between organic carbon flux and deer-sea deposit feeding // Ecol. Mar. Deposit Feeders/ New. York etc. 1989, 24-58.
  21. <https://dissercat.wordpress.com/>