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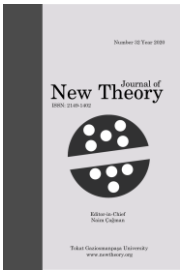

Number Density, Dynamics, Concentration Places and Status of Species from the Genera Diving Ducks (Aythya Boil, 1822) and Mergansers (Merqus Linn., 1758) in the South Part of the Azerbaijan Sector of Caspian Sea

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Abstract – The information about the number, density, the largest concentration places, and the status of species of genera Aythya and Merqus in the South part of the Azerbaijan sector of the Caspian Sea presented in the paper. It was revealed that 4 species of Aythya and 3 species of Merqus live in Azerbaijan.

Keywords – *Caspian Sea, coastal belt, concentration places, reproduction period, common, distribution*

1. Introduction

Four species of the genus diving ducks (common pochard - *Aythya ferina* Linn., 1758, white-eyed pochard - *Aytha nyroca* Ciuld, 1770, tufted duck - *Aythya fuligula* Linn., 1758, greater scaup - *Aythya marila* Linn., 1761) is spread in the southern coast of the Azerbaijan sector of the Caspian Sea. One of these species (the white-eyed pochard) is found annually, and the other is found both in winter and during migration [1]. The white-eyed pochard is included both in the Red Book of Azerbaijan and in the Red List of the International Union for Conservation of Nature [2, 3]. The common pochard is included only in the Red Book of the International Union for Conservation of Nature [3].

Three species of the genus Mergansers live in Azerbaijan, including the southern coast of the Azerbaijan sector of the Caspian Sea: smew (*Mergus albellus* Linn., 1758), red-breasted merganser (*Mergus serrator* Linn., 1758), goosander (*Mergus merganser* Linn., 1758). All 3 species are found in Azerbaijan during the periods of migration and wintering [1].

It is known that the negative impact of anthropogenic factors reduces the number of some bird species in nature, and some species are disappeared. The aim of the research is to study the number, density, habitats,

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and status of the species in the genera of diving ducks and mergansers in the southern coast of the Azerbaijan sector of the Caspian Sea and on the basis of obtained data to develop scientifically-grounded measures to conserve these species.

2. Material and methods

The research was conducted in January-February 2014-2016. It took 115 days to collect the material. The study area was divided into separate areas differing from each other by environmental features. The total studied area was 1,766.5 km^2 (291 km^2 is the Shahdili-Alat strip, 293 km^2 is the southeast Shirvan coastline, 90 km^2 is the Salyan coastline, 891.5 km^2 is the Kyzylagach National Park).

The point counts method was used for counting birds in water areas. Peaks from 5 to 10 m high were selected for points. Birds were counted at a distance of 2-3 km. Birds counting was done after dividing the area into squares. The area of squares was 0.2 km^2 in the water reservoirs rich in cane and 18–20 km^2 in aquatorias [4, 5, 6]. The total number of birds in the Pirman harbor, Caspian and Aggush floodplains was calculated by the way of extrapolation.

The category of animals was determined by population density according to A.R.Kuzyakin [7] and G.T.Mustafayev [8]: The population with 0.1-0.9 individuals per 1 km^2 of the area is considered to be rare; the population of 1–10 individuals per 1 km^2 of the area is considered to be normal and the population with more than 10 individuals in the same area is considered to be large. During the study, telescopes, binoculars, cars, motor and non-motorboats were used.

3. Results and discussion

3.1. The common pochard.

The total number of the common pochard in the south part of the Azerbaijan sector of the Caspian Sea was 62015 in 2014, 54290 in 2015, 59795 in 2016 (Table 1). As the table shows in the period between 2014 and 2016 the 9,8 % of the total amount of the common pochard accounted for Khazar Shahdili-Alyat, 24,8 % for South-Eastern Shirvan, 5,1 % for Salyan, 0,6 % for Lankaran coastline, 0,7% for Big and Small Gyzylgaz lakes, 1,4% for Yenikend floodplain and 57,6% for Gyzylagach National Park.

Analyses of data show that the diving duck is numerous (10 or more specimens per 1 km^2) in the Shahdili-Alyat coastline, South - East Shirvan coastline, Salyan coastline, Big and Small Gyzylgaz lakes. And it is common (1 or more specimens per 1 km^2) in the Lankaran coastline, Gyzylagach National Park, Yenikend floodplain, and Shirvanovka lagoon.

Table 1. Number (specimen) and density of the common pochard in the south coastline of the Azerbaijan sector of the Caspian Sea in 2014-2016

Years / Studied areas	2014		2015		2016		Average	
	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2
Shahdili-Alyat coastline (291 km^2)	6000	206,1	6300	216,4	5100	175,2	5800	199,3
South- East Shirvan coastline (111 km^2)	1800	162,1	19000	1711,7	23000	2072	14600	1315,3
Big and Small Gyzylgaz lakes (42 km^2)	300	71,4	450	107,1	530	126,1	426,6	101,5
Yenikend floodplain and Shirvanovka lagoon (141 km^2)	915	64,8	820	58,1	745	52,8	826,6	586
Salyan coastline (90 km^2)	8000	888,8	470	52,2	580	64,4	3016,6	335,1
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Gyzylagach National Park (891,5 km^2)	44500	499,1	27000	302,9	29500	333,9	33866,6	377,6
Lankaran coastline (180 km^2)	500	27,7	250	13,8	340	18,8	363,3	20,1
Number and density in the total studied areas (1746,5 km^2)	62015	355	54290	310	59795	342	58700	336,1

3.2. White-eyed pochard.

The total number of the white-eyed pochard was 998 specimen in winter of the 2014 year, 1231 specimen in the breeding period of the same year, 1470 specimen in winter of 2015, 1826 in the breeding period of the same year, 250 specimens in winter of 2016, 3029 specimens in the breeding period of the same year (Table 2).

As the table shows in the period from 2014 to 2016 96,3 % of the total amount of the white-eyed pochard in the winter and 98,5% of it in the breeding period fell on the share of Gyzylagach National Park, 0,6 % in the winter and 0,8 % in the breeding period fell on the share of Big and Small Gyzylgaz lakes, 0,4 % in the winter and 0,6 % in the breeding period fell on the share of Yenikend floodplains, and only 0,7% in the winter fell on the share of Absheron-Gobustan coastline, 1,1 % on the share of South - East Shirvan coastline, 0,06 % on the share of Salyan coastline, 0,8 % on the share of Lankaran coastline. Table 2 shows that the main gathering place for white-eyed pochard in winter and during the breeding season is Gyzylagach National Park.

An analysis of the data shows that in the above stated specially protected areas, the white-eyed pochard is a common species (i.e., more than 1 or 1 bird occurs per 1 km2 both in the breeding season and in winter). In such coastal zones of the Caspian Sea as Shahdili-Alyat, South-East Shirvan, Salyan, and Lankaran coastlines specimens are found only in winter, in Big and Small Gyzylgaz lakes, Yenikend floodplain and in the Shirvanovka lagoon they are found both in winter and during the breeding season. The species is at risk of extinction (less than 0.1 birds occur per 1 km2).

Table 2. Number of the white-eyed pochard in the south coastline of the Azerbaijan sector of the Caspian Sea in 2014-2016

Studied areas \ Years	2014		2015		2016	
	In winter	In breeding	In winter	In breeding	In winter	In breeding
Shahdili-Alyat coastline (291 km^2)	6	-	28	-	-	-
South- East Shirvan coastline (111 km^2)	12	-	19	-	38	-
Big and Small Gyzylgaz lakes (42 km^2)	9	11	16	21	13	18
1	**2**	**3**	**4**	**5**	**6**	**7**
Yenikend floodplain and Shirvanovka lagoon (141km^2)	4	-	7	6	9	11
Salyan coastline (90 km^2)	3	-	-	-	-	-
Gyzylagach National Park (891,5 km^2)	960	1200	1400	1800	2450	1100
Lankaran coastline (180 km^2)	4	-	-	-	-	-
Number and density in the total studied areas (1746,5 km^2)	998	1231	1470	1826	2510	3029

3.3. Tufted duck.

The total number of tufted duck in the coastal strip of the southern coastline of the Azerbaijani sector of the Caspian Sea in winter was 75,480 in 2014, 65,861 in 2015, and 69,720 in 2016 (Table 3). As the table 3 within 2014-2016 years, averagely 26,8 % of the total number of tufted duck occurred in the Shahdili-Alyat coastline of the Caspian Sea, 29,8% in the South - East Shirvan coastline, 2,6% in the Salyan coastline, 0,3% in the Lankaran coastline, 0,3% in the Big and Small Gyzylgaz lakes, 0,6% in the Yenikend floodplain and Shirvanovka lagoon, 39,6% in the Gyzylagach National Park.

As it has shown from the above-mentioned facts the main places of congestion for tufted duck are Shahdili-Alyat coastline, South- East Shirvan coastline, and the Gyzylagach National Park.

An analysis of the data shows that the tufted duck is numerous (i.e., 10 or more birds per 1 km2) in the Shahdili-Alyat, South - East Shirvan, Salyan coastlines of the Caspian Sea and in the Kyzylagach National Park, and it is common (i.e. 1 or more birds per 1 km2) in the Big and Small Gyzylgaz lakes, Yenikend coastline, Shirvanovka lagoon and in the Lankaran coastal strip of the Caspian Sea.

Table 3. Number (specimen) of the tufted duck in the south coastline of the Azerbaijan sector of the Caspian Sea in 2014-2016

Studied areas \ Years	2014		2015		2016		Average	
	Number	Density, 10 km^2	Number	Density, 10 km^2	Number	Density, 10 km^2	Number	Density, 10 km^2
Shahdili-Alyat coastline (291 km^2)	16000	549.8	22500	773.1	18000	618.5	18833.3	641.1
South- East Shirvan coastline (111 km^2)	19000	1711,7	23000	2072	21000	1891,8	21000	1891,8
Big and Small Gyzylgaz lakes (42 km^2)	180	42,8	211	50,2	160	38	183,6	43,7
Yenikend floodplain and Shirvanovka lagoon (141 km^2)	400	38,3	350	24,9	560	39,7	436,6	30,9
Salyan coastline (90 km^2)	1100	122,2	2500	277,7	1900	211,1	1833,3	203,7
Gyzylagach National Park (891,5 km^2)	38600	432,9	17150	192,3	27800	311,8	27850	312,9
Lankaran coastline (180 km^2)	200	11,1	150	8,3	300	16,6	216,6	12
Number and density in the total studied areas (1746,5 km^2)	75480	432,1	65861	377,1	69720	399,1	70353	402,8

3.4. Tufted duck.

This species is not numerous. The number of the greater scaup in the southern coastline of the Azerbaijan sector of the Caspian Sea in the winter of 2014 amounted to 6994, 2015 - 2440, 2016 - 5468 (Table 4). The table 4 shows that in 2014-2016 years averagely 3,7% of the total amount of the greater scoup occurred in the Shahdili-Alyat coastline of the Caspian Sea, 7,5%- in the South - East Shirvan coastline, 0,1 %- in the Salyan coastline, 0,04 %- in the Lankaran coastline, 0,4% - in the Big and Small Gyzylgaz lakes, 0,1%- in the Yenikend floodplain and Shirvanovka lagoon, 88,9% - in the Gyzylagach National Park.

Thus, the main places of congestion for the greater scaup is the Gyzylagach National Park.

An analysis of the data shows that in the South - East Shirvan coastline, in the Kyzylagach National Park the greater scaup is common (i.e. 1 or more birds per 1 km^2), in the coastlines of Shahdili-Alat, Salyan, Lankaran, in the Big and Small Gyzylgaz lakes and the Yenikend floodplain the species is at risk of extinction (i.e., 0.1 or fewer birds per 1 km^2).

Table 4. Number and density (specimen) of the greater scaup in the south coastline of the Azerbaijan sector of the Caspian Sea in 2014-2016

Years / Studied areas	2014		2015		2016		Average	
	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2
Shahdili-Alyat coastline (291 km^2)	28	0,9	250	8	270	9	182	6
South- East Shirvan coastline (111 km^2)	48	4,3	400	36	670	60	372	33
Big and Small Gyzylgaz lakes (42 km^2)	-	0	5	1,1	8	1,9	13	0,09
Yenikend floodplain and Shirvanovka lagoon (141 km^2)	4	0,2	3	0,2	12	0,8	6	0,4
Salyan coastline (90 km^2)	7	0,2	2	0,2	8	0,8	5	0,5
Gyzylagach National Park (891,5 km^2)	6900	77,3	1780	19,9	4500	50,4	4393	49,1
Lankaran coastline (180 km^2)	7	0,3	-	0	-	0	2,3	0,1
Number and density in the total studied areas (1746,5 km^2)	6994	40	2440	13,9	5468	31,3	4967,3	28,4

3.5. Tufted duck.

The total amount of smew in the southern coastline of the Azerbaijan sector of the Caspian Sea in the winter of 2014-was 676, 2015- 825, 2016 - 1120 (Table 5). As the table shows in 2014-2016 years 36,3% of the total amount of smew occurred in the Shahdili-Alyat coastline of the Caspian Sea, 41,7%- in the South - East Shirvan coastline, 0,7 %- in the Salyan coastline, 0,1 %- in the Lankaran coastline and 21,2 %- in the Gyzylagach National Park.

As it can be seen from the above, wintering places for smew are the Shahdili-Alyat and the South - East Shirvan coastlines of the Caspian Sea and the Gyzylagach National Park.

An analysis of the data shows that in the Shahdili-Alyat and South - East Shirvan coastlines the smew is common (i.e. 1 or more birds per 1 km2), in the Salyan and Lankaran coastlines and the Kyzylagach National Park it always was not numerous (i.e., 0.1 or fewer birds per 1 km2). The smew was not recorded in the Big and Small Gyzylgaz lakes, the Yenikend floodplain and Shirvanovka lagoon.

Table 5. Number and density (specimen) of the greater scaup in the south coastline of the Azerbaijan sector of the Caspian Sea in 2014-2016

Years	2014		2015		2016		Average	
	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2
Shahdili-Alyat coastline (291 km^2)	210	7,2	410	14	370	12,7	330	11,3
South- East Shirvan coastline (111 km^2)	200	1,8	315	28,5	520	46,8	349	31
Big and Small Gyzylgaz lakes (42 km^2)	0		0		0		0	0
Yenikend floodplain and Shirvanovka lagoon (141 km^2)	0		0		0		0	0
Salyan coastline (90 km^2)	6	0,6	7	0,7	5	0,5	6	0,6
Gyzylagach National Park (891,5 km^2)	260	2,9	90	1	230	2	193,3	2,1
Lankaran coastline (180 km^2)	0		4	0,2	0		1,3	0,07
Number and density in the total studied areas (1746,5 km^2)	676	3,8	826	4,7	1120	6,4	907,3	5,1

3.6. Red-breasted merganser.

The total amount of red-breasted merganser in the southern coastline of the Azerbaijan sector of the Caspian Sea in the winter of 2014-was 632, 2015- 758, 2016 - 695 (Table 6). As it has shown from the table in 2014-2016 years 39,6% of the total amount of red-breasted merganser occurred in the Shahdili-Alyat coastline of the Caspian Sea, 48,3%- in the South - East Shirvan coastline, 1,5 %- in the Salyan coastline, 0,5 %- in the Lankaran coastline and 10,3 %- in the Gyzylagach National Park.

As it can be seen from the above, wintering places for red-breasted merganser are the Shahdili-Alyat and the South - East Shirvan coastlines of the Caspian Sea and the Gyzylagach National Park.

Table 6. Number and density (specimen) of the red – breasted merganser in winter in the south coastline of the Azerbaijan sector of the Caspian Sea in 2014-2016

Years / Studied areas	2014		2015		2016		Average	
	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2
Shahdili-Alyat coastline (291 km^2)	200	6.8	315	10.8	310	10.6	275	9.4
South- East Shirvan coastline (111 km^2)	290	26,1	400	36	318	28,6	336	30,2
Big and Small Gyzylgaz lakes (42 km^2)	0		0		0		0	0
Yenikend floodplain and Shirvanovka lagoon (141 km^2)	0		0		0		0	0
Salyan coastline (90 km^2)	12	1,3	8	0,8	11	1,2	10	1,1
Gyzylagach National Park (891,5 km^2)	130	1,4	35	0,3	50	0,5	7 1 , 6	0,8
Lankaran coastline (180 km^2)	4	0,2	0	0	6	0,3	3,3	0,1
Number and density in the total studied areas (1746,5 km^2)	632	3,6	758	4,3	695	3,9	695	3,9

An analysis of the data shows that in the South - East Shirvan coastlines only the red – breasted merganser is common (i.e. 1 or more birds per 1 km^2), in the Shahdili-Alyat, Salyan and Lankaran coastlines of the Caspian Sea, in the Kyzylagach National Park and in the Big and Small Gyzylgaz lakes, the Yenikend floodplain it is rare (i.e., 0.1 or fewer birds per 1 km^2).

3.7. Goosander.

The total amount of goosander in the southern coastline of the Azerbaijan sector of the Caspian Sea in the winter of 2014-was 140, 2015- 138, 2016 - 177 (Table 7). As it has shown from the table 23% of the total amount of goosander occurred in the Shahdili-Alyat coastline of the Caspian Sea, 28% - in the South - East Shirvan coastline, 11,4 % - in the Salyan coastline, 1,5 % - in the Lankaran coastline and 35,2 % - in the Gyzylagach National Park.

An analysis of the data shows that Shahdili-Alyat, Salyan, and Lankaran coastlines of the Caspian Sea and in the Kyzylagach National Park the goosander is rare (i.e., 0.1 or fewer birds per 1 km^2) and in the Big and Small Gyzylgaz lakes, the Yenikend floodplain it as not recorded.

Table 7. Number and density (specimen) of the goosander in winter in the south coastline of the Azerbaijan sector of the Caspian Sea in 2014-2016

Years / Studied areas	2014		2015		2016		Average	
	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2	Number	Density 10 km^2
Şahdili-Ələt coastline (291 km^2)	7	0,2	41	1,4	57	1,9	35	1,2
Shahdili-Alyat coastline (291 km^2)	36	3,2	28	2,5	67	6	43	3,8
South- East Shirvan coastline (111 km^2)	0		0		0		0	0
Big and Small Gyzylgaz lakes (42 km^2)	0		0		0		0	0
Yenikend floodplain and Shirvanovka lagoon (141 km^2)	13	1,4	21	2,3	18	2	17,3	1,9
Salyan coastline (90 km^2)	80	0,8	45	0,5	35	0,3	53	0,5
Gyzylagach National Park (891,5 km^2)	4	0,2	3	0,1	-	0	2,3	o,1
Lankaran coastline (180 km^2)	140	0,8	138	0,7	177	1	151,6	0,8

4. Results and recommendations

1. The common pochard and tufted duck are numerous (respectively 33,6 specimens per 1 km^2 and 40,2 specimens per 1 km^2), greater scaup is common (28 specimens per 1 km^2), white-eyed pochard, smew, and red-breasted merganser are rare (respectively 0,5 specimens per 1 km^2, 0,3 specimens per 1 km^2) in the southern coastline of the Azerbaijan sector of the Caspian Sea. Only single specimens of the goosander were registered not depending on the effects of anthropogenic and abiotic factors.
2. The main concentration places of diving ducks and mergansers are Shahdili coastline, Kyzylagach National Park and South - East Shirvan coastline.

   To maintain and increase the number of diving ducks and mergansers in the southern coastlines of the Azerbaijan sector of the Caspian Sea, the following recommendations should be implemented:

   1) Increase in the area of Shahdili coastline;
   2) Granting the status of the reserve to the Yenikend lagoon and the adjacent coastal waters of the Caspian;
   3) Felling of old dense reed beds in the water bodies of the Kyzylagach National Park;

Removal of diving ducks and mergansers from the list of hunting birds.

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