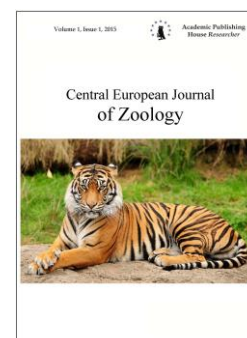


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## Transformation of the Avifauna on Imeretinskaya Lowland after Sochi 2014 Olympic and Paralympic Games

Lev M. Shagarov <sup>a, \*</sup>

<sup>a</sup>Natural ornithological park in the Imeretinskaya Lowland, Sochi, Russian Federation

### Abstract

This article provides avifauna inventory results of the Imeretinskaya Lowland in the period after Sochi 2014 Olympic and Paralympic Games, whose preparation and conduct led to a significant landscape and bird population transformation of the territory. Based on a comparative analysis of species diversity and distribution of birds throughout 2013 to 2016 and inventory data of previous years the main transformation directions of the Imeretinskaya Lowland avifauna are determined.

**Keywords:** avifauna, ornithological park, Imeretinskaya Lowland, Sochi 2014.

### 1. Introduction

Creation the Natural Ornithological Park in the Imeretinskaya Lowland in 2010 was intended to make up for the negative impact of measures on preparation and conducting of the Sochi 2014 Olympic and Paralympic Games on the Imeretinskaya Lowland ecosystems. Already, we can draw some conclusions about the changes in species, quantitative composition and the distribution of birds within the study territory by comparing the current data of avifauna monitoring in the Ornithological Park to the census data of the previous years.

Periodic studies of the Imeretinskaya Lowland area prior to creation of the Ornithological Park were conducted by the Caucasian State Nature Biosphere Reserve, Sochi National Park, Russian Geographical Society, North-Caucasus Federal University (Til'ba, 1990, 1999, 2001, Khokhlov, Il'yukh, 2007). Recent comprehensive studies, including evaluation of the species composition of the Imeretinskaya Lowland avifauna, are published in paper of 2008 "Natural complexes of the Imeretinskaya Lowland: biodiversity, zoological importance, recommendations on conservation" (Akatov et al., 2008).

### 2. Objects and methods

Since 2013, employees of the Natural Ornithological Park in the Imeretinskaya Lowland (hereinafter – Ornithological Park) have been conducting monitoring of species and quantitative composition of the Imeretinskaya Lowland bird population. The observations are carried out throughout the year. Small area and good visibility of the Ornithological Park areas allows for a quite accurate identification of numbers of each bird species on a given territory, without resorting to the methods of relative census of birds. At each site all individuals of all bird species are

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\* Corresponding author  
E-mail addresses: [lev049@mail.ru](mailto:lev049@mail.ru) (L.M. Shagarov)

recorded, including migratory flocks (which are indicated separately). High census frequency (at least 16 times per month) allows re Lev M. Shagarov liable determining of the bird distribution in the territory of the Ornithological Park as well as identifying the dynamics of species composition and abundance of birds.

It is worth noting that the Ornithological Park territory includes not only 8 sites located directly within the Imeretinskaya Lowland but also 6 plots located in the Nizhneshilovsky rural district, Adler district of Sochi City. Since the latter, from a geographical point of view, are not part of the Imeretinskaya Lowland and up to 2013 there have been no special avifauna studies conducted, those bird species identified only in submontane areas and not detected in any of the Imeretinskaya Lowland areas are not displayed in this article.

### 3. Results and discussion

In the 2013 to 2016, the presence of 181 bird species was revealed on the territory of the Imeretinskaya Lowland. 32 of them are migratory breeding species and nest in the territory of the Ornithological Park, 8 are non-breeding summer visitors, 9 are resident breeding species, 118 are passage visitors, 48 are winter visitors of the Park territory and 31 species are vagrant. The following table (Table 1) allows comparing the modern avifauna composition of the Natural Ornithological Park in the Imeretinskaya Lowland to the avifauna composition in the Imeretinskaya Lowland in the pre-Olympic period (2000 to 2009).

**Table 1.** Avifauna of the Imeretinskaya Lowland in 2000 to 2009 and 2013 to 2016

No	Scientific name of species	Status in 2000-2009	Status in 2013-2016
1.	<i>Gavia arctica</i>	V (W)	–
2.	<i>Tachybaptus ruficollis</i>	P, W	N*, P, W
3.	<i>Podiceps nigricollis</i>	P, W	W
4.	<i>Podiceps grisegena</i>	–	P*
5.	<i>Podiceps cristatus</i>	P, W	P, W
6.	<i>Pelecanus crispus</i>	W	W*
7.	<i>Phalacrocorax carbo</i>	P, W	W
8.	<i>Phalacrocorax pygmaeus</i>	P*, W*	P, W
9.	<i>Botaurus stellaris</i>	P, W	P, W
10.	<i>Ixobrychus minutus</i>	B, P	B?, P
11.	<i>Nycticorax nycticorax</i>	P	P
12.	<i>Ardeola ralloides</i>	P	P
13.	<i>Ardea alba</i>	P, W	P, W
14.	<i>Egretta garzetta</i>	P, V (W)	P
15.	<i>Ardea cinerea</i>	N, P, W	N, P, W
16.	<i>Ardea purpurea</i>	P	P
17.	<i>Bubulcus ibis</i>	–	P
18.	<i>Platalea leucorodia</i>	W*	–
19.	<i>Plegadis falcinellus</i>	P	P
20.	<i>Ciconia ciconia</i>	P	–
21.	<i>Ciconia nigra</i>	V (Pf)	–
22.	<i>Branta ruficollis</i>	W*	W*
23.	<i>Anser anser</i>	W	W*
24.	<i>Anser albifrons</i>	P, W	W
25.	<i>Cygnus olor</i>	N, P, W	W*
26.	<i>Cygnus cygnus</i>	W*	W*
27.	<i>Tadorna ferruginea</i>	W	–
28.	<i>Tadorna tadorna</i>	W	V (Pf*)
29.	<i>Anas platyrhynchos</i>	B, P, W	R

30.	<i>Anas crecca</i>	P, W	P, W
31.	<i>Anas strepera</i>	P, W	W
32.	<i>Anas penelope</i>	P, W	W
33.	<i>Anas acuta</i>	P, W	P*
34.	<i>Anas querquedula</i>	P	P
35.	<i>Anas clypeata</i>	P, W*	P, W
36.	<i>Netta rufina</i>	W*	W*
37.	<i>Aythya ferina</i>	P*, W	P, W
38.	<i>Aythya nyroca</i>	N*, P*, W*	W*
39.	<i>Aythya fuligula</i>	P, W	W
40.	<i>Aythya marila</i>	–	V
41.	<i>Bucephala clangula</i>	P, W	W*
42.	<i>Oxyura leucocephala</i>	V (P)	W*
43.	<i>Mergus albellus</i>	P*, W	W*
44.	<i>Mergus serrator</i>	–	W*
45.	<i>Pernis apivorus</i>	P	P*
46.	<i>Milvus migrans</i>	P, W	Pf
47.	<i>Circus cyaneus</i>	P, W	P, W
48.	<i>Circus macrourus</i>	P	P*
49.	<i>Circus pygargus</i>	P	–
50.	<i>Circus aeruginosus</i>	P, W	N, P, W
51.	<i>Accipiter gentilis</i>	P	P*, W*
52.	<i>Accipiter nisus</i>	P, W	P, W
53.	<i>Accipiter brevipes</i>	P	–
54.	<i>Buteo lagopus</i>	W	–
55.	<i>Buteo rufinus</i>	W	–
56.	<i>Buteo buteo</i>	N, P, W	N, P, W
57.	<i>Circaetus gallicus</i>	P*	P*
58.	<i>Aquila pomarina</i>	P*	–
59.	<i>Haliaeetus albicilla</i>	V (W)	–
60.	<i>Falco peregrinus</i>	P, W	–
61.	<i>Falco subbuteo</i>	B, P	B, P
62.	<i>Falco columbarius</i>	V (W)	–
63.	<i>Falco vespertinus</i>	P	P
64.	<i>Falco tinnunculus</i>	P, W	P, W
65.	<i>Coturnix coturnix</i>	B, P, V(W)	B?, P
66.	<i>Grus grus</i>	P	V (Pf*)
67.	<i>Grus virgo</i>	V (P)	–
68.	<i>Rallus aquaticus</i>	P, W	P
69.	<i>Porzana porzana</i>	P	P
70.	<i>Porzana parva</i>	P	P
71.	<i>Crex crex</i>	P	–
72.	<i>Gallinula chloropus</i>	R	R
73.	<i>Porphyrio porphyrio</i>	P*, W*	V (Pf)
74.	<i>Fulica atra</i>	B, P, W	N, P, W
75.	<i>Otis tarda</i>	W*	–
76.	<i>Tetrax tetrax</i>	P, W*	V (W)
77.	<i>Burhinus oedienemus</i>	Pf*	V (Pf*)
78.	<i>Pluvialis apricaria</i>	P, W*	–
79.	<i>Charadrius hiaticula</i>	Ps	Ps
80.	<i>Charadrius dubius</i>	B, P	B?*, P*
81.	<i>Charadrius morinellus</i>	P*	–
82.	<i>Vanellus vanellus</i>	P, W	Pf

83.	<i>Himantopus himantopus</i>	Ps	P
84.	<i>Recurvirostra avosetta</i>	–	V
85.	<i>Tringa ochropus</i>	N, P, W	N, P, W
86.	<i>Tringa glareola</i>	P	P
87.	<i>Tringa nebularia</i>	P	P*
88.	<i>Tringa totanus</i>	V (P)	–
89.	<i>Tringa erythropus</i>	V (P)	–
90.	<i>Tringa stagnatilis</i>	V (P)	P*
91.	<i>Actitis hypoleucos</i>	N, P	N, P
92.	<i>Phalaropus lobatus</i>	V (P)	–
93.	<i>Philomachus pugnax</i>	Ps	Ps
94.	<i>Calidris minuta</i>	V (P)	V (Pf)
95.	<i>Calidris ferruginea</i>	–	P*
96.	<i>Lymnocyptes minimu</i>	P	P
97.	<i>Gallinago gallinago</i>	P, W	P
98.	<i>Scolopax rusticol</i>	W	V (P*)
99.	<i>Numenius arquata</i>	P	–
100.	<i>Limosa limosa</i>	–	P*
101.	<i>Glareola pratincola</i>	V (Ps)	–
102.	<i>Glareola nordmanni</i>	V (Ps)	–
103.	<i>Larus ichthyaetus</i>	V (W)	–
104.	<i>Larus minutus</i>	W	–
105.	<i>Larus ridibundus</i>	W	V
106.	<i>Larus cachinnans</i>	V	V
107.	<i>Larus canus</i>	W*	W*
108.	<i>Chlidonias niger</i>	P	P
109.	<i>Chlidonias leucopterus</i>	P	P
110.	<i>Chlidonias hybrida</i>	V (P)	P
111.	<i>Gelochelidon nilotica</i>	V (P)	P
112.	<i>Sterna hirundo</i>	V (P)	P
113.	<i>Columba palumbus</i>	W	V
114.	<i>Columba oenas</i>	P	–
115.	<i>Columba livia</i>	R	R
116.	<i>Streptopelia decaocto</i>	B*, W	R
117.	<i>Streptopelia turtur</i>	B, P	P
118.	<i>Cuculus canorus</i>	N, P	P
119.	<i>Asio otus</i>	P, W*	–
120.	<i>Asio flammeus</i>	V (P, W)	V (Pf)
121.	<i>Otus scops</i>	V (P)	V (Ps)
122.	<i>Tyto alba</i>	B, W	–
123.	<i>Caprimulgus europaeus</i>	N, P	V (Pf)
124.	<i>Apus apus</i>	N, P	B, P
125.	<i>Apus melba</i>	V (P)	–
126.	<i>Coracias garrulus</i>	P	P*
127.	<i>Alcedo atthis</i>	N, P, W	N, P, W
128.	<i>Merops apiaster</i>	P	P
129.	<i>Upupa epops</i>	B, P	P
130.	<i>Jynx torquilla</i>	P*	P
131.	<i>Dendrocopos major</i>	W*	–
132.	<i>Dendrocopos leucotos</i>	V (W)	–
133.	<i>Riparia riparia</i>	P	P
134.	<i>Hirundo rustica</i>	B, P	B, P
135.	<i>Cecropis daurica</i>	–	Ps*

136.	<i>Delichon urbica</i>	B, P	B, P
137.	<i>Galerida cristata</i>	B*, P*	P
138.	<i>Calandrella cinerea</i>	P	P
139.	<i>Melanocorypha calandra</i>	P*	–
140.	<i>Lullula arborea</i>	Pf, W*	–
141.	<i>Alauda arvensis</i>	P, W	P
142.	<i>Anthus campestris</i>	P*	P*
143.	<i>Anthus trivialis</i>	P, W*	P
144.	<i>Anthus pratensis</i>	P, W	P
145.	<i>Anthus cervinus</i>	P	P
146.	<i>Anthus spinoletta</i>	P*	–
147.	<i>Motacilla flava</i>	P	P
148.	<i>Motacilla lutea</i>	–	Ps*
149.	<i>Motacilla feldegg</i>	P	B, P
150.	<i>Motacilla citreola</i>	P	Ps
151.	<i>Motacilla cinerea</i>	V	V
152.	<i>Motacilla alba</i>	B, P, W	B, P, W
153.	<i>Lanius collurio</i>	B, P	B, P
154.	<i>Lanius nubicus</i>	–	V (Ps)
155.	<i>Lanius minor</i>	B?, P	P
156.	<i>Lanius excubitor</i>	W*	–
157.	<i>Oriolus oriolus</i>	V (P)	V (Ps)
158.	<i>Sturnus vulgaris</i>	B, P, W*	B, P, W*
159.	<i>Sturnus roseus</i>	P	P
160.	<i>Garrulus glandarius</i>	P	W
161.	<i>Corvus monedula</i>	P*	V
162.	<i>Corvus frugilegus</i>	P, W	P, W
163.	<i>Corvus cornix</i>	R	R
164.	<i>Corvus corax</i>	V	V (Pf)
165.	<i>Troglodytes troglodytes</i>	W	W
166.	<i>Prunella modularis</i>	W	V
167.	<i>Cettia cetti</i>	V (P)	–
168.	<i>Locustella luscinioides</i>	V (P)	B?, P
169.	<i>Locustella fluviatilis</i>	P	B?, P
170.	<i>Locustella naevia</i>	V*	–
171.	<i>Acrocephalus melanopogon</i>	P	–
172.	<i>Acrocephalus schoenobaenus</i>	B?, P	P
173.	<i>Acrocephalus agricola</i>	V (P)	–
174.	<i>Acrocephalus palustris</i>	B, P	B, P
175.	<i>Acrocephalus scirpaceus</i>	P*	–
176.	<i>Acrocephalus arundinaceus</i>	B, P	B, P
177.	<i>Hippolais pallida</i>	B	B
178.	<i>Sylvia nisoria</i>	B	B?, P
179.	<i>Sylvia atricapilla</i>	B, P	B?, P
180.	<i>Sylvia borin</i>	P	B?, P
181.	<i>Sylvia communis</i>	B, P	B, P
182.	<i>Sylvia curruca</i>	P	–
183.	<i>Phylloscopus trochilus</i>	P	P
184.	<i>Phylloscopus collybita</i>	P, W	P
185.	<i>Phylloscopus sibilatrix</i>	–	P
186.	<i>Phylloscopus lorenzii</i>	V (P)	–
187.	<i>Phylloscopus nitidus</i>	V (P)	–
188.	<i>Regulus regulus</i>	–	Pf, V (W)

189.	<i>Regulus ignicapillus</i>	W*	W
190.	<i>Ficedula albicollis</i>	–	B?, P
191.	<i>Ficedula parva</i>	–	P
192.	<i>Muscicapa striata</i>	B, P	P
193.	<i>Saxicola rubetra</i>	P	P
194.	<i>Saxicola rubicola</i>	B, P, W*	P
195.	<i>Oenanthe oenanthe</i>	P	P
196.	<i>Oenanthe deserti</i>	–	Pf*
197.	<i>Oenanthe isabellina</i>	P*	P*
198.	<i>Phoenicurus phoenicurus</i>	P	P
199.	<i>Phoenicurus ochruros</i>	P*, W	P, W
200.	<i>Erithacus rubecula</i>	W, V	W, V
201.	<i>Luscinia luscinia</i>	P	P
202.	<i>Luscinia megarhynchos</i>	P	P
203.	<i>Luscinia svecica</i>	P, W*	P
204.	<i>Turdus pilaris</i>	W	V (W)
205.	<i>Turdus merula</i>	R	R
206.	<i>Turdus iliacus</i>	V (W)	–
207.	<i>Turdus philomelos</i>	P*, W*	V
208.	<i>Turdus viscivorus</i>	P	V
209.	<i>Panurus biarmicus</i>	V (P)	V (Pf)
210.	<i>Aegithalos caudatus</i>	V (W)	V (W)
211.	<i>Parus caeruleus</i>	N, W	W
212.	<i>Parus major</i>	W	B?, P, W
213.	<i>Passer domesticus</i>	R	R
214.	<i>Passer montanus</i>	P, W	P*, W
215.	<i>Fringilla coelebs</i>	R, W	R, W
216.	<i>Fringilla montifringilla</i>	P, W	V (P)
217.	<i>Chloris chloris</i>	R	R
218.	<i>Spinus spinus</i>	P	P, V (W)
219.	<i>Carduelis carduelis</i>	R	P, V (W)
220.	<i>Acanthis cannabina</i>	P	–
221.	<i>Coccothraustes coccothraustes</i>	V (P)	–
222.	<i>Emberiza calandra</i>	B, P	B?, P
223.	<i>Emberiza citrinella</i>	P	P
224.	<i>Emberiza cia</i>	V (W)	–
225.	<i>Emberiza schoeniclus</i>	P	P
226.	<i>Emberiza hortulana</i>	P	P
227.	<i>Emberiza melanocephala</i>	P	P
228.	<i>Plectrophenax nivalis</i>	V (W)	–

Abbreviations used for status:

<b>R</b>	Resident breeding species	<b>N</b>	Non-breeding summer visitors
<b>B</b>	Migratory breeding species	<b>W</b>	Winter visitors (common)
<b>B?</b>	Presumably breeding species	<b>V</b>	Vagrant
<b>P</b>	Passage visitors (common)	*	Only one record for a few years
<b>Ps</b>	Passage visitors, spring only	–	No record in the Imeretinskaya Lowland
<b>Pf</b>	Passage visitors, autumn only		

The avifauna composition of the Imeretinskaya Lowland has changed significantly in the post-Olympic period. As compared to the period of 2000 to 2009, in 2013 to 2016, 49 bird species are being no longer registered in the territory of Imeretinskaya Lowland: black-throated loon *Gavia arctica*, spoonbill *Platalea leucorodia*, white stork *Ciconia ciconia*, black stork *Ciconia*

*nigra*, ruddy shelduck *Tadorna ferruginea*, Montagu's harrier *Circus pygargus*, Levant sparrowhawk *Accipiter brevipes*, rough-legged buzzard *Buteo lagopus*, long-legged buzzard *Buteo rufinus*, lesser spotted eagle *Aquila pomarina*, white-tailed eagle *Haliaeetus albicilla*, peregrine falcon *Falco peregrinus*, merlin *Falco columbarius*, demoiselle crane *Grus virgo*, corncrake *Crex crex*, great bustard *Otis tarda*, golden plover *Pluvialis apricaria*, dotterel *Charadrius morinellus*, redshank *Tringa totanus*, spotted redshank *Tringa erythropus*, red-necked phalarope *Phalaropus lobatus*, curlew *Numenius arquata*, collared pratincole *Glareola pratincola*, black-winged pratincole *Glareola nordmanni*, Pallas's gull *Larus ichthyaetus*, little gull *Larus minutus*, stock dove *Columba oenas*, long-eared owl *Asio otus*, barn owl *Tyto alba*, alpine swift *Apus melba*, great spotted woodpecker *Dendrocopos major*, white-backed woodpecker *Dendrocopos leucotos*, calandra lark *Melanocorypha calandra*, woodlark *Lullula arborea*, water pipit *Anthus spinoletta*, great grey shrike *Lanius excubitor*, Cetti's warbler *Cettia cetti*, grasshopper warbler *Locustella naevia*, moustached warbler *Acrocephalus melanopogon*, paddyfield warbler *Acrocephalus agricola*, reed warbler *Acrocephalus scirpaceus*, lesser whitethroat *Sylvia curruca*, Caucasian mountain chiffchaff *Phylloscopus lorenzii*, green warbler *Phylloscopus nitidus*, redwing *Turdus iliacus*, linnet *Acanthis cannabina*, hawfinch *Coccothraustes coccothraustes*, rock bunting *Emberiza cia*, snow bunting *Plectrophenax nivalis*.

20 bird species ceased to winter in the Imeretinskaya Lowland: shelduck *Tadorna tadorna*, pintail *Anas acuta*, black kite *Milvus migrans*, water rail *Rallus aquaticus*, purple swamphen *Porphyrio porphyrio*, little bustard *Tetrax tetrax*, lapwing *Vanellus vanellus*, snipe *Gallinago gallinago*, black-headed gull *Larus ridibundus*, wood pigeon *Columba palumbus*, skylark *Alauda arvensis*, tree pipit *Anthus trivialis*, meadow pipit *Anthus pratensis*, dunnoek *Prunella modularis*, chiffchaff *Phylloscopus collybita*, stonechat *Saxicola rubicola*, bluethroat *Luscinia svecica*, fieldfare *Turdus pilaris*, song thrush *Turdus philomelos*, brambling *Fringilla montifringilla*.

8 species no longer nest in the Imeretinskaya Lowland: coot *Fulica atra*, turtle dove *Streptopelia turtur*, hoopoe *Upupa epops*, crested lark *Galerida cristata*, lesser grey shrike *Lanius minor*, sedge warbler *Acrocephalus schoenobaenus*, spotted flycatcher *Muscicapa striata*, stonechat *Saxicola rubicola*. Little ringed plover *Charadrius dubius* began to nest in the Imeretinskaya Lowland not every year.

There is a positive trend, though. In the post-Olympic period, 15 birds species were registered in the Imeretinskaya Lowland that have been never seen on this territory before. Red-necked grebe *Podiceps grisegena* first noted in the post-Olympic period, began to dwell on the territory of the Ornithological Park during migration. Cattle egret *Bubulcus ibis* first noted in the post-Olympic period began to dwell on the territory of the Ornithological Park during migration. One unit of greater scaup *Aythya marila* first observed in the Imeretinskaya Lowland on December 03, 2014. Red-breasted merganser *Mergus serrator* began to winter on ponds of the Ornithological Park, but not every year. In the post-Olympic period is marked by several visitations of avocet *Recurvirostra avosetta* in the territory of the Imeretinskaya Lowland. Curlew sandpiper *Calidris ferruginea* and black-tailed godwit *Limosa limosa* started being noted during migration (not every year). Several units of red-rumped swallow *Cecropis daurica* were noted in the Imeretinskaya Lowland during spring migration in 2016. Yellow wagtail *Motacilla lutea* was first noted in April, 2016, masked shrike *Lanius nubicus* was first noted on May 18, 2015 (Shagarov, Borel', 2015b). During migration and winter movement goldcrest *Regulus regulus* was noted on the territory of the Ornithological Park. Wood warbler *Phylloscopus sibilatrix* and red-breasted flycatcher *Ficedula parva* began to appear in the Imeretinskaya Lowland during migration. Collared flycatcher *Ficedula albicollis* also began to appear during the migration period, in addition, we assume that this species has began nesting in the Imeretinskaya Lowland. Desert wheatear *Oenanthe deserti* was first discovered in the Imeretinskaya Lowland on November 17, 2015 (Til'ba, Shagarov, 2016).

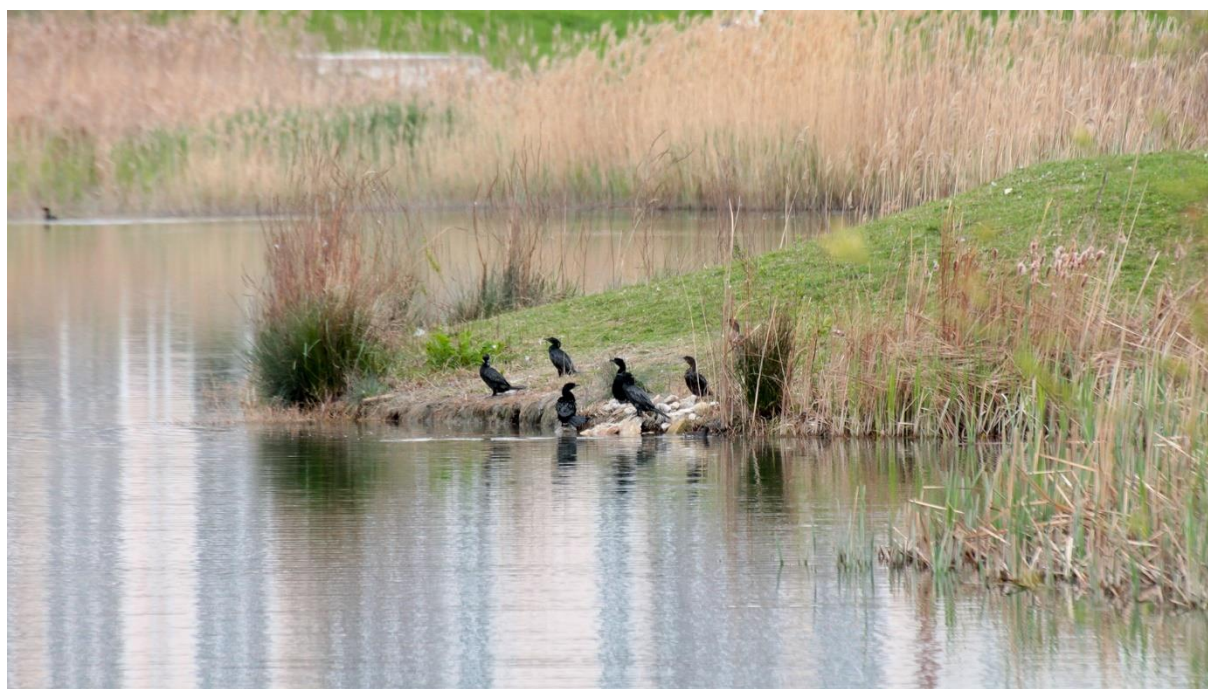
Many bird species have changed their status. For example, little grebe *Tachybaptus ruficollis* and western marsh harrier *Circus aeruginosus* began to appear in the Ornithological Park in the summer, although is has been just a passing and wintering species in the past. Goshawk *Accipiter gentilis*, observed in previous years only on passage can now be found in the Ornithological Park and wintering. Whiskered tern *Chlidonias hybrida*, gull-billed tern *Gelochelidon nilotica*, common tern *Sterna hirundo* and bearded reedling *Panurus biarmicus* are regularly observed during migration, whereas only rare visitations of these species were observed previously. Jay *Garrulus glandarius* are now a wintering species of the Ornithological Park. Yellow wagtail *Motacilla*

*feldegg* began again nesting in the Imeretinskaya Lowland, previously this species' nesting was noted in the territory by P.A. Tilba at the end of the 80s of the 20th century (Til'ba, 2001). Active pairing in the breeding season and frequent appearance in the summer suggest that the Savi's warbler *Locustella luscinioides*, river warbler *Locustella fluviatilis*, garden warbler *Sylvia borin* and great tit *Parus major* began nesting on the territory of the Ornithological Park.

In the post-Olympic period 11 rare and endangered species of birds listed in the Red Book of the Russian Federation (The Red Book, 2001) are noted in the Imeretinskaya Lowland. Pygmy Cormorant *Phalacrocorax pygmaeus* is found in the Imeretinskaya Lowland both during migrations and in small pygmy cormorant flocks of up to 25 birds that winter on lakes of the Ornithological Park (Figure 1). Cattle egret *Bubulcus ibis* is a rare passage visitor (Shagarov, Borel', 2015a). Ferruginous duck *Aythya nyroca* and the white-headed duck *Oxyura leucocephala* (Figure 2) winter on the lakes of the Ornithological Park, but not every year.

#### 4. Conclusion

Of course, most of the changes in the bird populations of the Imeretinskaya Lowland is connected with anthropogenic changes of the territory. Over the past 10 years, the area of natural and agricultural landscapes of the Imeretinskaya Lowland suitable for breeding, wintering and dwelling of birds during migrations decreased by 15 times (Figure 3) (Til'ba et al., 2014).



**Fig. 1.** Pygmy cormorants *Phalacrocorax pygmaeus* wintering on one of the lakes of the Natural Ornithological Park in the Imeretinskaya Lowland. March 22, 2016





**Fig. 2.** – 2 ♀ white-headed ducks *Oxyura leucocephala* on one of the lakes of the Ornithological Park March 23, 2016



**Fig. 3.** Satellite images of Imeretinskaya Lowland in 2005, 2010 and 2013 (green line shows border areas of the Ornithological Park)

Despite this, though the species diversity of birds of the Natural Ornithological Park in the Imeretinskaya Lowland has become less than in the pre-Olympic period (2000 to 2009), it is still comparable in terms of species number. Census results of 2013 to 2016 indicate that the Imeretinskaya Lowland remains attractive to birds. Avifauna of the Ornithological Park is diverse and consistent with its specially protected natural area status.

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