

BREEDING BIRDS IN THE NARTA LAGOON (SW ALBANIA) IN 2016

Gnezdilke lagune Narta (JZ Albanija) leta 2016

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The Narta Lagoon (59 km²) is one of the largest and most important coastal wetlands for migratory and wintering waterbirds in Albania. However, the breeding bird fauna of the site is still poorly studied. The current work aims to broaden the knowledge on the list of breeding bird species, their numbers, distribution and threats in the zone (with a focus on waterbirds). Relevant information for spring migrants is also provided. The survey consisted of two field visits in April and May 2016. The entire wetland area was covered and all its habitats were visited. In total, 136 bird species were observed. The total number of breeding birds was estimated at 6,400 pairs of 85 species. The most abundant breeders were the Little Tern *Sternula albifrons* with 377 breeding pairs (bp), Avocet *Recurvirostra avosetta* with 121 bp, and Kentish Plover *Charadrius alexandrinus* with 96 bp. In total, 3,461 individuals belonging to 80 species were recorded as non-breeders. At the species level, the most numerous were Kentish Plover with 1,100 individuals (ind.), Marsh Sandpiper *Tringa stagnatilis* with 600 ind., Greater Flamingo *Phoenicopterus roseus* with 321 ind., Common Shelduck *Tadorna tadorna* with 130 ind., Spotted Redshank *Tringa erythropus* with 120 ind. and Dunlin *Calidris alpina* with 100 ind. Breeding birds assemblages within the main studied habitats (salinas, lagoon, pine forests, mixed farmland, rocky hills with olive trees, and grasslands with bushes near the coast) and threats (the most significant of which were illegal shooting, trapping and dangerous power grid) are also described. Recommendations for future bird-friendly management, appropriate conservation activities and eco-tourism in the area are made.

Keywords: avifauna, wetlands, waterbirds, conservation, Adriatic Sea
Ključne besede: avifavna, mokrišča, vodne ptice, naravovarstvo, Jadransko morje

1. Introduction

Situated few kilometres north of Vlora, the Narta Lagoon is one of the largest and most important coastal wetlands of Albania (CATAUDELLA *et al.* 2015). With a total area of 59 km², half of which are covered by water, the lagoon is amongst the top sites for wintering and migratory waterbirds in the country. During winter, the lagoon hosts more than 50% of the species and over 10% of the counted individuals of water birds in Albania (81,223 individuals counted in 1997, BIRDLIFE INTERNATIONAL 2016a; more recent data reveals a decrease in numbers –10,672 ind. in 2016, BINO & CARUGATI 2016). Regarding its national importance for waterbirds, Narta ranks immediately after the lakes Shkodra, Divjake-Karavasta, and Prespe e Madhe. Ducks and Coots *Fulica atra* are the most common wintering species, whereas 31 bird species occurring in the area are considered rare in Albania. At the international level, the Narta Lagoon shelters four

Globally Endangered species, including Dalmatian Pelican *Pelecanus crispus* NT, Great Spotted Eagle *Clanga clanga* VU, Ferruginous Duck *Aythya nyroca* NT and White-headed Duck *Oxyura leucocephala* E (AOS 2016). The site is further considered as potentially favourable for the Slender-billed Curlew *Numenius tenuirostris*. The Narta Lagoon has been shown to be an important stop-over site for migrating waterbirds. About 5,500 waterbirds from 40 species were recorded in the area in April 2014 (IANKOV *et al.* 2015).

However, considering the international importance of the site, the breeding avifauna of Narta Lagoon is still poorly studied. In the 1990s, no waterbird breeding colonies were reported from around the lagoon (ZEKHUIS & TEMPELMAN 1998, BIRDLIFE INTERNATIONAL 2016a). Currently, it is known that terns and waders are the most common nesting waterbirds (AOS 2016), but there are gaps in the knowledge on the full list of breeding species, their distribution, numbers and threats.

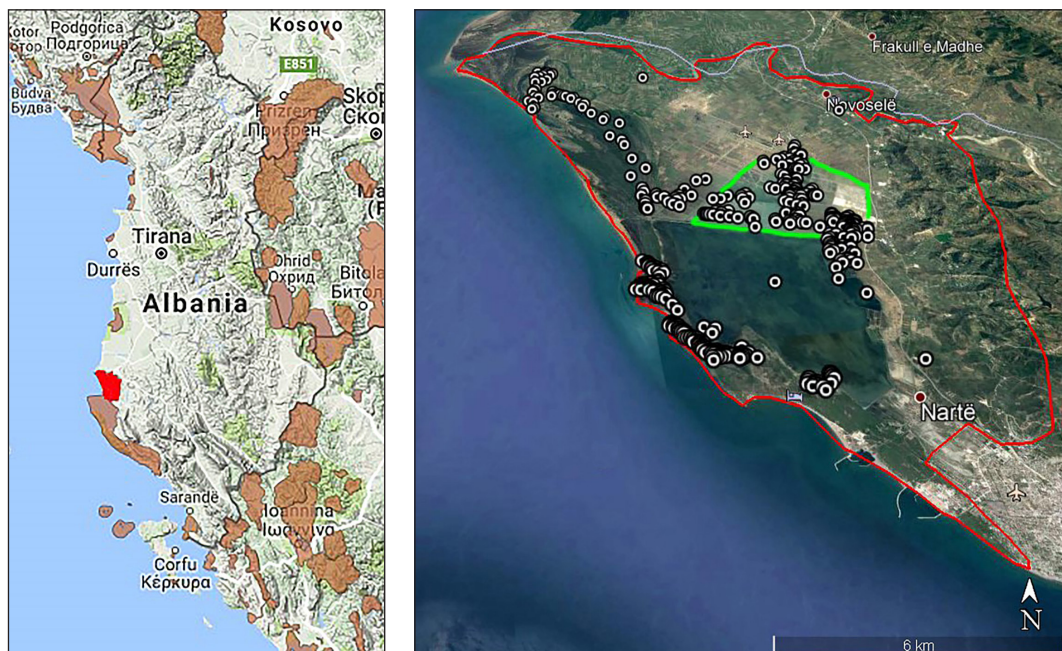


Figure 1: Location (left) and borders (right; marked red) of the KBA Narta Lagoon. Points indicate the observation points during the survey. Green line indicates the borders of salinas. (source: Google Maps)

Slika 1: Lokacija (levo) in meje (desno) lagune Narta. Točke označuju opazovalna mesta med raziskavo, zelena črta pa označuje mejo solin (vir: Google Maps)

The current study aims to contribute to the knowledge of the breeding bird fauna, especially waterbirds, in the Narta Lagoon. We provide particularly information on the breeding status, population numbers, distribution and threats. In addition, relevant data for spring migrants are provided. Our information could be useful for a future bird-friendly management, the design of appropriate conservation activities and nature friendly tourism in the area.

2. Methods

2.1. Study area

The study area overlaps with the boundaries of the KBA (central coordinates 40°35' N and 19°23'E); however, most of our study efforts were concentrated around the wetlands and surrounding habitats (Figure 1).

The site mainly consists of a large, shallow and brackish lake (Lake Nartes) and a number of coastal lagoons between the Vjosa river delta and the nearest city of Vlora. The altitude varies from 0 to 246 m a.s.l. Narta lagoon, with a surface of 59 km² (CATAUDELLA *et al.* 2015), represents the central part of the area and is divided from the sea by a barrier island which is mainly covered by pine forests. Large, mainly eastern and northern parts of the area have been converted into agricultural lands or salt pans. The lagoon is connected to the sea through two artificial channels – one in the south and one in the north. The average depth of the lagoon is 1.2 m (varying between 1.1 m and 2.1 m). The salinity is up to 78.0‰ (in winter it decreases to 36‰, similar to the Adriatic Sea). The pH is 8.4–8.8. In terms of habitats, wetland areas cover 37%, agricultural lands (including olive-groves) about 33% and forests only 6% of the area (pine plantations and scattered poplar plantations). The remaining 24% are occupied by urban and areas of other land use categories (TOPI *et al.* 2013). The Narta Lagoon is surrounded by hills in the eastern part, agricultural lands in the northern part, two small lagoons in the north-west, and one small lagoon in the south-west. The lake surface decreases by 30% (especially when the connection with the sea is blocked) during summer and large mudflats are exposed. Coastal habitats include dunes, beaches and rocky shores, with *Pinus pinea* and *Pinus halepensis* (BIRDLIFE INTERNATIONAL 2016a).

Operative salt pans are situated in the north-eastern part of Narta Lagoon. They were constructed in the early 1950s. Their current surface area covers over 15 km² and they are composed of shallow evaporation basins separated by many small dams.

The area of Narta Lagoon is a part of the Emerald Network of Albania, recognized by the Critical Ecosystem Partnership Fund (CEPF) as Key Biodiversity Area (KBA), and a part of the National Network of Protected Areas in Albania, holding the status of the Protected Landscape (IUCN, category IV) which was proclaimed based on the Decision by the Council of Ministers (DCM) No. 680 from 22. 10. 2004 covering a total area of 197.4 km² (TOPI *et al.* 2013, CATAUDELLA *et al.* 2015). Currently, the Narta Lagoon is also considered a site for the future implementation of the European Union's Natura 2000 network (NATURAL 2017).

2.2. Data collection

The fieldwork consisted of two field visits in 2016: the first was conducted for two days on 5 and 6 Apr 2016, and the second for four days between 24 and 28 May 2016. We surveyed all the wetlands and surrounding habitats wherever accessible by car and we located observation points in all sites with good visibility on the studied habitats or from which breeding colonies could be censused (Figure 1). The areas without roads were visited as much as feasible by foot. Bird observations were done without fixed radius or fixed duration of the count (e.g. as stated in GIBBONS & GREGORY 2006), as our aim was not to collect data on bird abundances but to perform as much absolute counts for waterbirds as possible, while data collected on passerines and other groups of birds are only indicative. Special attention was given to locate the breeding colonies of waterbirds within the KBA and to identify the major threats to birds. To increase the survey effort, the team split into two groups (all members of each group used binoculars and there was one spotting scope per group). Observations were performed mainly in the morning between 06.00 and 09.00hrs and in the evening (no playback survey) between 18.00 and 22:00hrs local time.

In the field, bird data were collected by the software SmartBirds Pro application for Android OS (POPGORGIEV *et al.* 2015) using

smartphones or tablet. The following information for each bird observation was recorded: species, exact geographical coordinates, bird numbers (individual, pair, nest, family with juveniles and flock), behaviour and breeding status (EBCC 2015): possible, probable and confirmed; non-breeders were recorded, too.

2.3. Data analyses

Data were exported from SmartBirds Pro into Microsoft Office Excel. A checklist of bird species in the KBA was compiled, together with information on the number of observed individuals or breeding pairs, and the habitat types in which they were observed. Thus, key areas for breeding and non-breeding birds were identified.

International conservation status was described according to BIRDLIFE INTERNATIONAL (2004, 2016b) and national conservation status according

to the RED LIST OF ALBANIAN FLORA AND FAUNA (2013). The distribution of birds was described according to the following main habitat types in the KBA: (1) *Salinas* – artificial ponds separated by dikes and shafts used for salt production; (2) *Lagoon* – includes the natural part of the lagoon and ruined dikes of former fishponds; (3) *Pine forests* – old pine forests on sandy dunes in the western part of the KBA; (4) *Rural mosaics* – mosaics of pastures, meadows, tree lines and arable lands, mostly in the northern part of KBA; (5) *Rocky hills with olive trees* – dry hills with olive plantations between the main road to Vlore and the eastern border of KBA; (6) *Grasslands with bushes near the coast* – grasslands located along the coast in the western part of the KBA, including some sandy dunes; (7) *Settlements* – urban zones; (8) *Coastline*; and (9) *Sea*.

Human threats within the KBA were ranked in three categories based on their potential timing and severity: (1) *Significant* – continuous high

Table 1: List of breeding birds in Narta Lagoon Key Biodiversity Area: their status, distribution and numbers

Tabela 1: Seznam gnezdilak lagune Narta, njihov status, razširjenost in številčnost

Species / Vrsta	Breeding status/ Gnezditveni status	Number of breeding pairs/ Število gnezdečih parov		The most important habitat types for the species within the KBA/ Glavni habitatni tip vrste
		Observed/ Opazovani	Estimated/ Ocenjeni	
<i>Tadorna tadorna</i>	Probable	1	1	Salinas
<i>Anas platyrhynchos</i>	Confirmed	1	10	Lagoon
<i>Coturnix coturnix</i>	Possible	2	2	Rural mosaics
<i>Tachybaptus ruficollis</i>	Confirmed	3	10	Lagoon
<i>Ixobrychus minutus</i>	Possible	2	5	Lagoon
<i>Circaetus gallicus</i>	Possible	1	1	Rural mosaics
<i>Circus aeruginosus</i>	Possible	1	1	Rural mosaics
<i>Circus pygargus</i>	Possible	1	1	Rural mosaics
<i>Accipiter nisus</i>	Possible	3	3	Grassland with bushes near the coast/ Rural mosaics
<i>Buteo buteo</i>	Possible	4	4	Rural mosaics /Rocky hills with olive trees
<i>Falco tinnunculus</i>	Possible	1	1	Pine forest
<i>Falco subbuteo</i>	Possible	1	1	Rural mosaics
<i>Rallus aquaticus</i>	Possible	1	5	Lagoon

Nadaljevanje tabele 1 / Continuation of Table 1

Species / Vrsta	Breeding status/ Gnezditveni status	Number of breeding pairs/ Število gnezdečih parov		The most important habitat types for the species within the KBA/ Glavni habitatni tip vrste
		Observed/ Opazovani	Estimated/ Ocenjeni	
<i>Gallinula chloropus</i>	Confirmed	6	10	Lagoon
<i>Haematopus ostralegus</i>	Possible	1	1	Coastline
<i>Himantopus himantopus</i>	Confirmed	52	60	Salinas
<i>Recurvirostra avosetta</i>	Confirmed	121	191	Salinas
<i>Burhinus oedicnemus</i>	Confirmed	26	30	Salinas/ Rural mosaics
<i>Glareola pratincola</i>	Confirmed	15	15	Salinas/ Rural mosaics
<i>Charadrius dubius</i>	Confirmed	3	10	Lagoon/ Coastline
<i>Charadrius alexandrinus</i>	Confirmed	96	120	Salinas
<i>Chroicocephalus genei</i>	Possible	2	15	Salinas/Lagoon
<i>Larus michahellis</i>	Confirmed	1	1	Salinas
<i>Sternula albifrons</i>	Confirmed	377	400	Salinas/Lagoon
<i>Sterna hirundo</i>	Confirmed	64	64	Salinas/Lagoon
<i>Sterna sandvicensis</i>	Possible	2	2	Salinas
<i>Streptopelia decaocto</i>	Probable	1	10	Rural mosaics
<i>Streptopelia turtur</i>	Probable	1	1	Rural mosaics
<i>Tyto alba</i>	Possible	1	15	Settlements
<i>Otus scops</i>	Probable	5	50	Pine forest
<i>Athene noctua</i>	Confirmed	2	30	Settlements
<i>Caprimulgus europaeus</i>	Probable	2	20	Grassland with bushes near the coast
<i>Tachymarpis melba</i>	Possible	2	25	Settlements
<i>Apus apus</i>	Possible	10	10	Settlements
<i>Merops apiaster</i>	Confirmed	35	50	Pine forest / Coastline
<i>Upupa epops</i>	Probable	4	20	Grassland with bushes near the coast
<i>Jynx torquilla</i>	Probable	2	10	Grassland with bushes near the coast
<i>Dendrocopos syriacus</i>	Probable	1	20	Grassland with bushes near the coast
<i>Melanocorypha calandra</i>	Confirmed	7	60	Rural mosaics
<i>Calandrella brachydactyla</i>	Confirmed	25	100	Salinas/ Rural mosaics
<i>Galerida cristata</i>	Confirmed	7	80	Rural mosaics
<i>Riparia riparia</i>	Confirmed	40	40	Sandy dunes
<i>Hirundo rustica</i>	Confirmed	10	200	Rural mosaics
<i>Delichon urbicum</i>	Confirmed	61	600	Rural mosaics

Nadaljevanje tabele 1 / Continuation of Table 1

Species / Vrsta	Breeding status/ Gnezditveni status	Number of breeding pairs/ Število gnezdečih parov		The most important habitat types for the species within the KBA/ Glavni habitatni tip vrste
		Observed/ Opazovani	Estimated/ Ocenjeni	
<i>Cecropis daurica</i>	Confirmed	7	100	Rural mosaics
<i>Anthus campestris</i>	Confirmed	11	60	Grassland with bushes near the coast/ Rural mosaics
<i>Motacilla flava</i>	Confirmed	4	20	Salinas/ Rural mosaics
<i>Luscinia megarhynchos</i>	Probable	15	150	Pine forest/Grassland with bushes near the coast
<i>Saxicola rubicola</i>	Probable	3	20	Rural mosaics /Rocky hills with olive trees
<i>Oenanthe oenanthe</i>	Probable	4	4	Rural mosaics
<i>Oenanthe hispanica</i>	Possible	2	2	Rural mosaics
<i>Turdus merula</i>	Probable	4	20	Pine forest
<i>Cettia cetti</i>	Probable	21	500	Several habitat types (no clear preference)
<i>Cisticola juncidis</i>	Confirmed	13	150	Salinas/ Rural mosaics
<i>Acrocephalus arundinaceus</i>	Probable	7	80	Salinas/Lagoon
<i>Hippolais pallida</i>	Confirmed	43	600	Several habitat types (no clear preference)
<i>Hippolais olivetorum</i>	Probable	3	100	Grassland with bushes near the coast
<i>Sylvia atricapilla</i>	Possible	1	1	Rocky hills with olive trees
<i>Sylvia crassirostris</i>	Confirmed	1	20	Grassland with bushes near the coast
<i>Sylvia curruca</i>	Possible	1	10	Grassland with bushes near the coast
<i>Sylvia communis</i>	Confirmed	1	20	Grassland with bushes near the coast
<i>Sylvia cantillans</i>	Confirmed	9	150	Pine forest/Grassland with bushes near the coast
<i>Sylvia melanocephala</i>	Confirmed	28	500	Pine forest/Grassland with bushes near the coast/Rocky hills with olive trees
<i>Sylvia rueppelli</i>	Probable	1	1	Grassland with bushes near the coast
<i>Phylloscopus collybita</i>	Possible	1	1	Grassland with bushes near the coast
<i>Aegithalos caudatus</i>	Possible	1	1	Grassland with bushes near the coast
<i>Parus major</i>	Confirmed	10	50	Pine forest/Grassland with bushes near the coast/Rocky hills with olive trees

Nadaljevanje tabele 1 / Continuation of Table 1

Species / Vrsta	Breeding status/ Gnezditveni status	Number of breeding pairs/ Število gnezdečih parov		The most important habitat types for the species within the KBA/ Glavni habitatni tip vrste
		Observed/ Opazovani	Estimated/ Ocenjeni	
<i>Oriolus oriolus</i>	Probable	3	30	Grassland with bushes near the coast
<i>Lanius collurio</i>	Probable	4	30	Rural mosaics /Pine forests
<i>Lanius senator</i>	Probable	5	60	Rural mosaics /Pine forests
<i>Garrulus glandarius</i>	Probable	1	1	Pine forest
<i>Pica pica</i>	Confirmed	6	50	Rural mosaics /Pine forests
<i>Corvus monedula</i>	Confirmed	6	10	Rural mosaics
<i>Corvus cornix</i>	Confirmed	16	100	Rural mosaics /Pine forests
<i>Corvus corax</i>	Confirmed	1	3	Rocky hills with olive trees
<i>Sturnus vulgaris</i>	Confirmed	2	20	Salinas/ Rural mosaics
<i>Passer domesticus</i>	Confirmed	26	300	Rural mosaics /Pine forests
<i>Passer hispaniolensis</i>	Probable	21	100	Rural mosaics
<i>Passer montanus</i>	Probable	2	20	Rural mosaics
<i>Fringilla coelebs</i>	Probable	4	20	Pine forest
<i>Carduelis chloris</i>	Probable	30	150	Pine forest
<i>Carduelis carduelis</i>	Confirmed	12	120	Rural mosaics /Pine forests
<i>Emberiza cirrus</i>	Probable	1	1	Rocky hills with olive trees
<i>Emberiza melanocephala</i>	Probable	8	20	Grassland with bushes near the coast
<i>Emberiza calandra</i>	Confirmed	24	500	Rural mosaics

level impact on bird populations; (2) *Moderate* – continuous low level or sporadic high level impact on bird populations; (3) *Marginal* – sporadic low level negative impact on bird populations.

In our effort to evaluate bird numbers and the distribution of the bird fauna in the KBA, we minimized the observer bias due to possible double counts between and within surveys in April and May by using in our calculations only the higher number recorded in one of both months (except for the breeding passerines when individuals were observed in distant areas), and respectively, conducting the census of birds for relatively short time periods and simultaneously by two field teams. Moreover, in the field we recorded the exact location

of every individual or flock of birds through the SmartBirds Application which additionally helped to avoid double counting. We assume a small bias due to double counting of flying over individual or small groups of birds can be present, though this bias should be negligible. Estimations of the sizes breeding populations were made based on the rough extrapolations of the number of observed individuals/pairs and the approximate ratios of visited and not visited areas of each habitat.

3. Results

In total, 136 bird species were observed in the KBA during the survey (Tables 1 & 2).

Table 2: List of spring migrants in Narta Lagoon Key Biodiversity Area: their numbers**Tabela 2:** Seznam spomladanskih selivk v laguni Narta in njihova številčnost

Species / Vrsta	Maximum number of observed individuals/ Maksimalno število opazovanih osebkov		The most important habitat types for the species within the KBA / Glavni habitatni za vrsto
	April 2016	May 2016	
<i>Tadorna tadorna</i>	130	40	Salinas
<i>Anas penelope</i>	25	-	Lagoon
<i>Anas platyrhynchos</i>	5	-	Lagoon
<i>Anas clypeata</i>	24	-	Lagoon
<i>Tachybaptus ruficollis</i>	5	-	Lagoon
<i>Podiceps nigricollis</i>	5	-	Lagoon
<i>Calonectris diomedea</i>	-	2	Sea
<i>Pelecanus crispus</i>	6	19	Lagoon/Salinas
<i>Phalacrocorax carbo</i>	5	-	Lagoon
<i>Nycticorax nycticorax</i>	1	-	Pine forest (<i>swamp</i>)
<i>Egretta garzetta</i>	56	9	Lagoon
<i>Ardea alba</i>	6	-	Lagoon
<i>Ardea cinerea</i>	12	1	Lagoon
<i>Plegadis falcinellus</i>	18	-	<i>In flight</i>
<i>Platalea leucorodia</i>	-	20	Salinas
<i>Phoenicopiterus roseus</i>	321	289	Salinas/Lagoon
<i>Circus aeruginosus</i>	13	-	Rural mosaics
<i>Circus cyaneus</i>	2	-	Rural mosaics
<i>Circus macrourus</i>	1	-	Grassland with bushes near the coast
<i>Circus pygargus</i>	1	-	Rural mosaics
<i>Accipiter nisus</i>	2	-	Grassland with bushes near the coast/ Rural mosaics
<i>Buteo buteo</i>	6	-	Rural mosaics /Rocky hills with olive trees
<i>Pandion haliaetus</i>	1	-	Lagoon
<i>Falco naumanni</i>	1	-	<i>In flight</i>
<i>Falco tinnunculus</i>	2	-	Pine forest
<i>Fulica atra</i>	40	-	Lagoon
<i>Haemantopus ostralegus</i>	4	-	Coastline
<i>Himantopus himantopus</i>	23	24	Salinas
<i>Recurvirostra avosetta</i>	-	130	Salinas
<i>Charadrius hiaticula</i>	-	4	Salinas

Nadaljevanje tabele 2 / Continuation of Table 2

Species / Vrsta	Maximum number of observed individuals/ Maksimalno število opazovanih osebkov		The most important habitat types for the species within the KBA / Glavni habitatni za vrsto
	April 2016	May 2016	
<i>Charadrius alexandrinus</i>	1100	40	Salinas
<i>Pluvialis squatarola</i>	1	-	Salinas
<i>Calidris canutus</i>	3	3	Salinas
<i>Calidris alba</i>	4	-	Coastline
<i>Calidris minuta</i>	16	2	Coastline
<i>Calidris ferruginea</i>	70	22	Salinas
<i>Calidris alpina</i>	100	-	Salinas
<i>Limicola falcinellus</i>	-	1	Salinas
<i>Philomachus pugnax</i>	90	-	Salinas
<i>Limosa limosa</i>	2	-	Salinas
<i>Numenius phaeopus</i>	4	1	Salinas
<i>Numenius arquata</i>	-	1	Salinas
<i>Tringa erythropus</i>	120	-	Salinas
<i>Tringa totanus</i>	60	1	Salinas
<i>Tringa stagnatilis</i>	600	-	Salinas
<i>Tringa nebularia</i>	34	1	Salinas
<i>Tringa ochropus</i>	1	-	Rural mosaics (<i>river</i>)
<i>Actitis hypoleucos</i>	5	-	Rural mosaics (<i>river</i>)
<i>Chroicocephalus genei</i>	-	75	Salinas/Lagoon
<i>Chroicocephalus ridibundus</i>	7	10	Salinas/Lagoon
<i>Hydrocoloeus minutus</i>	-	4	Coastline
<i>Larus audouinii</i>	-	1	Lagoon
<i>Larus melanocephalus</i>	-	8	Salinas
<i>Larus michahellis</i>	2	2	Salinas
<i>Gelochelidon nilotica</i>	22	2	Salinas
<i>Hydroprogne caspia</i>	2	-	Salinas
<i>Chlidonias niger</i>	-	1	Salinas
<i>Sterna sandvicensis</i>	1	2	Salinas
<i>Tachymarpis melba</i>	60	30	Settlements
<i>Apus apus</i>	-	10	Grassland with bushes near the coast
<i>Upupa epops</i>	1	-	Grassland with bushes near the coast
<i>Jynx torquilla</i>	1	-	Grassland with bushes near the coast
<i>Riparia riparia</i>	10	-	Grassland with bushes near the coast
<i>Hirundo rustica</i>	16	-	Settlements

Nadaljevanje tabele 2 / Continuation of Table 2

Species / Vrsta	Maximum number of observed individuals/ Maksimalno število opazovanih osebkov		The most important habitat types for the species within the KBA / Glavni habitatni za vrsto
	April 2016	May 2016	
<i>Delichon urbicum</i>	16	-	Settlements
<i>Cecropis daurica</i>	25	-	Settlements
<i>Anthus trivialis</i>	6	-	Pine forest
<i>Anthus pratensis</i>	8	-	Rural mosaics
<i>Motacilla flava</i>	45	-	Rural mosaics
<i>Motacilla alba</i>	11	1	Grassland with bushes near the coast
<i>Erithacus rubecula</i>	1	-	Grassland with bushes near the coast
<i>Phoenicurus phoenicurus</i>	1	-	Grassland with bushes near the coast
<i>Saxicola rubetra</i>	4	-	Grassland with bushes near the coast
<i>Saxicola rubicola</i>	1	-	Rural mosaics / Rocky hills whit olive trees
<i>Oenanthe hispanica</i>	6	-	Rural mosaics
<i>Turdus philomelos</i>	1	-	Pine forest
<i>Sylvia atricapilla</i>	16	-	Rocky hills with olive trees
<i>Sylvia curruca</i>	3	-	Grassland with bushes near the coast
<i>Muscicapa striata</i>	-	2	Grassland with bushes near the coast
<i>Passer hispaniolensis</i>	3	-	Rural mosaics

3.1. Breeding birds

In total, 1,343 breeding pairs (bp) of birds were observed in the KBA, while the estimated maximum number is 6,400 bp, belonging to 85 species (Table 1; information per orders is available in Supplementary materials). We managed to confirm the breeding of 38 species; while 26 and 21 species, respectively, were found to be probable and possible breeding birds in the area. Among waterbirds, the most abundant breeder was the Little Tern *Sternula albifrons*, followed by Pied Avocet *Recurvirostra avosetta* and Kentish Plover *Charadrius alexandrinus*.

3.2. Spring migrants

In total, 3,461 individuals (ind.), belonging to 80 species, were recorded as non-breeders (Table 2; information per orders is available in Supplementary materials). Most of them were passing migrants,

however, it is possible that some bred outside the KBA and visit the lagoon for feeding and resting (e.g. pelicans, cormorants, egrets and others). The most abundant spring migrants were the waders, representing 72% (n = 2,501 ind.) of all migrants observed. At the species level, the most numerous migrant was Kentish Plover which constituted 32% (n = 1,100 ind.) of all migrants observed, Marsh Sandpiper *Tringa stagnatilis* 17% (n = 600 ind.), Greater Flamingo *Phoenicopterus roseus* 9% (n = 321 ind.), Common Shelduck *Tadorna tadorna*, Pied Avocet, Spotted Redshank *Tringa erythropus* and Dunlin *Calidris alpina*, each consisting 3-4% of all migrants.

3.3. Bird fauna of different habitat types

The salinas were the key habitat for waterbirds within the study area (Table 1), among which the most abundant were Little Tern (n = 260 pairs; 69% of the breeding population found in the KBA), Pied Avocet with (n = 121 pairs; 100%),

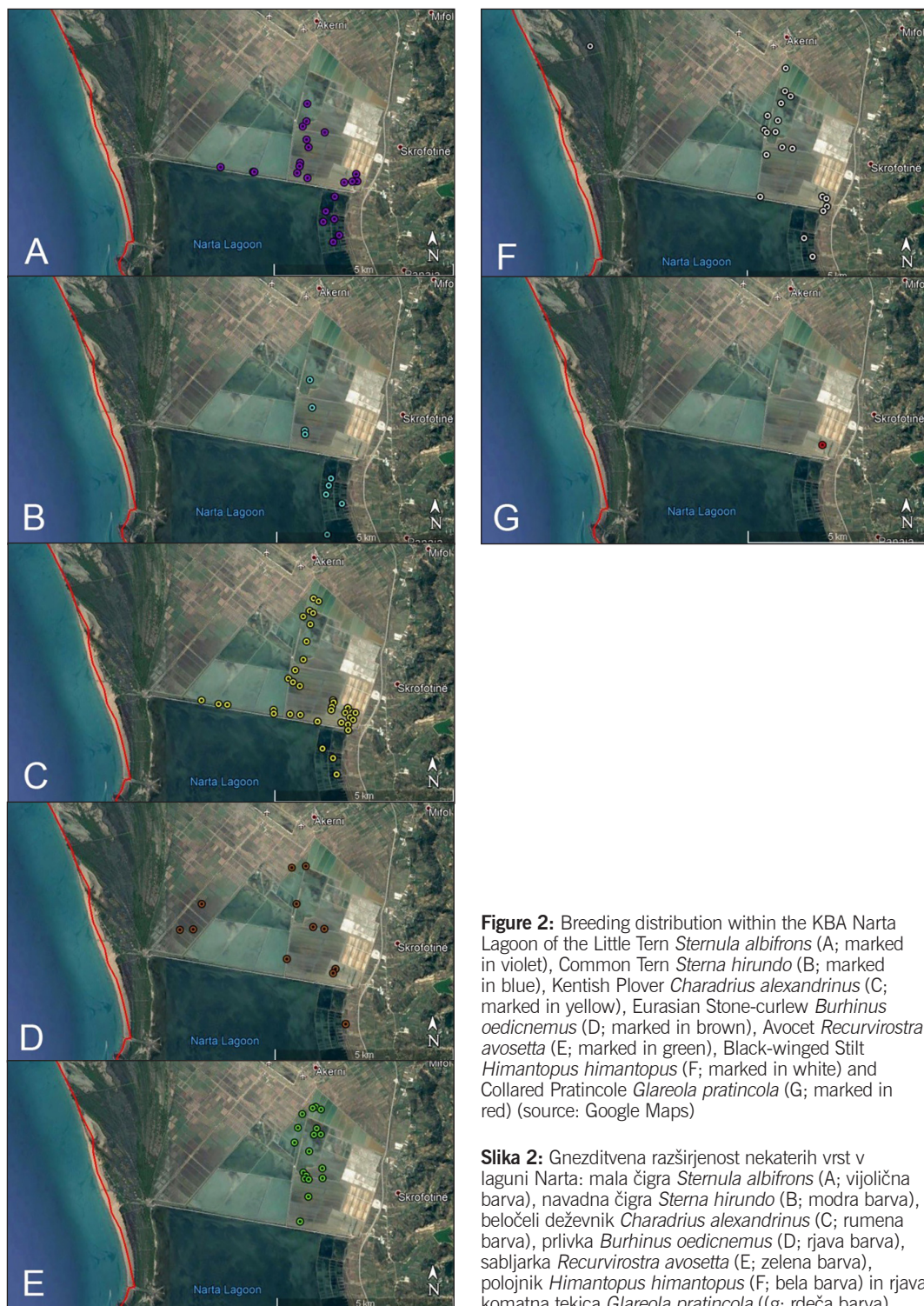


Figure 2: Breeding distribution within the KBA Narta Lagoon of the Little Tern *Sternula albifrons* (A; marked in violet), Common Tern *Sterna hirundo* (B; marked in blue), Kentish Plover *Charadrius alexandrinus* (C; marked in yellow), Eurasian Stone-curlew *Burhinus oedichnemus* (D; marked in brown), Avocet *Recurvirostra avosetta* (E; marked in green), Black-winged Stilt *Himantopus himantopus* (F; marked in white) and Collared Pratincole *Glareola pratincola* (G; marked in red) (source: Google Maps)

Slika 2: Gnezditvena razširjenost nekaterih vrst v laguni Narta: mala čigra *Sternula albifrons* (A; vijolična barva), navadna čigra *Sterna hirundo* (B; modra barva), beločeli deževnik *Charadrius alexandrinus* (C; rumena barva), prlivka *Burhinus oedichnemus* (D; rjava barva), sabljarka *Recurvirostra avosetta* (E; zelena barva), polojnik *Himantopus himantopus* (F; bela barva) in rjava komatna tekica *Glareola pratincola* (G; rdeča barva).

Table 3: Threats for the birds in Narta Lagoon, April – May 2016**Tabela 3:** Grožnje pticam v laguni Narta, aprila in maja 2016

Threat / Grožnja	Rank / Ocena pomembnosti	Evidence
Illegal shooting and trapping / Nedovoljen lov	Significant/ Pomembno	Tracks of firearm shooting were identified almost everywhere within the KBA. Two Greater Flamingos and one Eurasian Curlew found dead were suspected to be shot. Trapping of songbirds with mist nets for the aim of illegal trade was also registered.
Dangerous power grid/ Nezaščiteni daljnovodi	Significant/ Pomembno	Numerous medium voltage power lines pass the area of the lagoon with high risks for bird collisions, especially for large species such as pelicans, flamingos, spoonbills, herons and others. During the survey, two Greater Flamingos were observed with broken wings, probably due to collision with electric wires.
Free-ranging dogs/ Potepuški psi	Moderate/ Zmerno pomembno	A number of free-ranging dogs were observed in the area of the salina, therefore predation on nesting birds could be a potential threat in the KBA.
Abandoned fishing equipment and uncontrolled docking of fishing boats / Zapuščena ribiška oprema	Marginal/ Zanemarljivo	An Audouin's Gull was observed with a piece of fishnet stuck to its head.
Illegal logging of trees/ Nedovoljena sečnja	Marginal/ Zanemarljivo	Tracks from logging found within the KBA.

Kentish Plover ($n = 83$ pairs; 86%), Black-winged Stilt *Himantopus himantopus* ($n = 46$ pairs; 89%), Common Tern *Sterna hirundo* ($n = 37$ pairs; 58%), Eurasian Stone-curlew *Burhinus oedipnemos* ($n = 16$ pairs; 62%), and Collared Pratincole *Glareola pratincola* ($n = 15$ pairs; 100%) (Figure 2). The most common non-breeding waterbirds in the salinas were Kentish Plover ($n = 1,100$ ind.), Marsh Sandpiper ($n = 600$ ind.), and Greater Flamingo ($n = 321$ ind.) (Table 2).

In the lagoon, the most common waterbird breeders were the Little Tern ($n = 61$ pairs), Common Tern ($n = 27$ pairs), and Kentish Plover ($n = 18$ pairs) (Table 1), while for non-breeders these were the Greater Flamingo ($n = 84$ ind.) and the Slender-billed Gull *Chroicocephalus genei* ($n = 22$ ind.).

The pine forests were important habitat for passerines and nocturnal birds. Common breeders were the Sardinian Warbler *Sylvia melanocephala*, Subalpine Warbler *S. cantillans*, European Greenfinch

Carduelis chloris, and European Goldfinch *C. carduelis* and Eurasian Scops Owl *Otus scops*.

Common breeders in the rural mosaics were the Corn Bunting *Emberiza calandra*, Calandra Lark *Melanocorypha calandra*, and Tawny Pipit *Anthus campestris* (Table 1). This habitat was also sheltering 35% ($n = 9$ pairs) of the local breeding population of the Eurasian Stone-curlews. The mixed farmlands were frequently used as foraging area for raptors – all four European harrier species were observed there, as well as the Hobby *Falco subbuteo* and Common Buzzard *Buteo buteo*. During migration, this habitat was also an important stopover and foraging site for the Yellow Wagtails *Motacilla flava*, Spanish Sparrows, Meadow Pipit *Anthus pratensis*, Collared Pratincole and Gull-billed Tern *Gelochelidon nilotica* (Table 2).

The commonest breeders in the rocky hills with olive trees were the Sardinian Warbler, Subalpine Warbler, and Great Tit *Parus major* (Table 1).

The grasslands with bushes near the coast were a key habitat for passerines, especially warblers. A total of nine warbler species were found to breed there: Eastern Olivaceous Warbler *Hippolais pallida*, Cetti's Warbler, Olive-tree Warbler *Hippolais olivetorum*, Sardinian Warbler, Subalpine Warbler, Eastern Orphee Warbler *Sylvia crassirostris*, Lesser Whitethroat *S. curruca*, Common Whitethroat *S. communis* and Rüppell's Warbler *S. rueppelli* (Table 1). Other common breeders were the Black-headed Bunting *E. melanocephala*, Corn Bunting, Tawny Pipit and Crested Lark *Galerida cristata*.

3.4. Threats

Five different types of human-induced threats were identified during the survey (Table 3, Appendix 2). The most significant were illegal shooting, trapping and dangerous power grid. The free-ranging dogs were estimated as a moderate threat, while the abandoned fishing equipment, docking of fishing boats everywhere in the zone (incl. close to breeding colonies) and illegal logging of trees appears to have a marginal impact on the bird fauna.

4. Discussion

4.1. Overall importance of the site at the national and international levels

In terms of the global IUCN Red List status, two species are Vulnerable (Dalmatian Pelican and European Turtle Dove *Streptopelia turtur*) and five species are Near Threatened (Pallid Harrier *Circus macrourus*, Eurasian Oystercatcher *Haematopus ostralegus*, Curlew Sandpiper *Calidris ferruginea*, Black-tailed Godwit *Limosa limosa* and Eurasian Curlew *Numenius arquata*). Fifty-eight (58) of all registered species are included in the list of European conservation concern (SPEC) (BIRDLIFE INTERNATIONAL 2004). Four species (Dalmatian Pelican, Pallid, Lesser Kestrel and Audouin's Gull *Larus audouinii*) are of a global conservation concern (SPEC 1). The number of species in the KBA, the global populations of which are concentrated in Europe and have unfavourable conservation status (SPEC 2), is 13 (6 of them breeders), while the number of species, the

global populations of which are not concentrated in Europe but have unfavourable conservation status in Europe (SPEC 3), is 41 (19 of them breeders). Forty (40) species (16 of them breeders) are included in Annex 1 of the EU Birds Directive (Directive 2009/147/EC), 25 species in Annex 2 and two species in Annex 3. In total, 130 species are listed in Bern Convention (96 species – in Annex 2, and 34 species – in Annex 3), and 71 species are listed in Bonn Convention (three species – in Annex 1 and 68 species – in Annex 2).

Thirty-three (33) bird species, out of which eight species breed in the KBA, are included in the Red List of Albanian Flora and Fauna (2013): three species are Critically Endangered (CR), 10 species Endangered (EN), and 15 species Vulnerable (VU), while 5 other species fall into categories of lower conservation priority.

The current survey confirms that according to its bird fauna, the area of Narta lagoon is one of the richest and most important sites in Albania (BIRDLIFE INTERNATIONAL 2016a). During different seasons the area shelters over 30% of the birds species observed in the country (TOPI & NIKOLOV 2016). With at least 377 bp. the KBA holds about 2% of the European breeding population of Little Tern (EUROPEAN COMMISSION ENVIRONMENT 2016). Thus, at least for this species, the site is also important at the international level.

In terms of non-breeding birds (migrants, vagrants and birds feeding in the area but breeding in the surroundings), the lagoon is proven to be a key feeding ground for Dalmatian Pelican (AOS 2016). In April 2014, 94 individuals were recorded (IANKOV *et al.* 2015), and during the present survey up to 19 ind. were observed feeding and roosting in the lagoon. The pelicans, seen in Narta Lagoon, probably belong mainly to the only current Albanian nesting colony in Divjaka-Karavasta National Park (PEJA *et al.* 1996, CRIVELLI 1996). We confirmed that this KBA is an important stop-over and resting site for migrating waterbirds (ZEKHUIS & TEMPELMAN 1998, ERNST 2016). During the present survey, 1,100 Kentish Plovers were observed in just a single day. In April 2014, significant numbers of other migrating waders, herons, gulls, terns, and flamingos were also registered (IANKOV *et al.* 2015): Sanderling (*Calidris alba*) – 350 ind., Dunlin – 354 ind., Little

Ringed Plover (*Charadrius dubius*) – 274 ind., Spotted Redshank – 93 ind., Pied Avocet – 526 ind., Eurasian Curlew – 16 ind., Grey Heron (*Ardea cinerea*) – 61 ind., Western Great Egret (*Ardea alba*) – 42 ind., Little Egret (*Egretta garzetta*) – 175 ind., Spoonbill (*Platalea leucorodia*) – 20 ind., Slender-billed Gull – 322 ind., Yellow-legged Gull (*Larus michahellis*) – 158 ind., Black-headed Gull (*Chroicocephalus ridibundus*) – 254 ind., Caspian Tern (*Hydroprogne caspia*) – 24 ind., Greater Flamingo – 2,136 ind., etc.

4.2. Conservation and management planning

Continuous monitoring of breeding and non-breeding birds in the Narta Lagoon and the state of their habitats is needed to better understand the dynamics of the local avifauna. Also, collection of data on zoo-benthos, phytoplankton, ichthyofauna and basic physical and chemical parameters of the water in the lagoon can further help to estimate the state of the main food sources of waterbirds. Finally, more quantitative evidence needs to be collected on the anthropogenic threats and their impact on bird populations in the KBA: e.g. mortality due to illegal shooting, electrocution and collisions with electricity wires, and predation by feral dogs.

In terms of the identified threats for birds in Narta Lagoon, despite the total hunting ban (Law No. 61/2016 on prohibition of hunting in the Republic of Albania) and total ban on tree logging in the country (Law No. 5/2016 on the proclamation of the forest moratorium in the Republic of Albania), evidences of shooting with firearms was identified throughout the KBA. In addition, illegal tree cutting was recorded in some areas. Apart of direct mortality, shooting causes serious disturbances and compromise habitat quality for nesting and migratory birds in the KBA, while tree cutting destroys the habitat of many forest-dwelling species. Thus, enforcement of the existing hunting and logging ban by the local authorities is urgently needed.

Furthermore, most of medium voltage electric poles within the KBA create a high risk of electrocution and collision for soaring birds (JANSS 2000; IANKOV *et al.* 2015). Thus, securing dangerous power grids through insulation of the power poles to reduce the risk of electrocution and

the installation of bird diverters along power lines to prevent bird collisions is needed (BAVENGER 1994; JANSS & FERRER 1999).

Fishing is one of the main traditional and legal activities in the KBA. However, uncontrolled free movement and docking of boats cause disturbances and damage the breeding colonies of waterbirds. Abandoned or not regularly monitored fishing nets and other fishing equipment in the KBA is a serious threat for diving and other waterbirds which may become entangled in the nets. To mitigate these negative impacts on the avifauna, we recommend to enforce fishing ban in the area discussed, to create artificial island and platforms as appropriate undisturbed nesting and roosting sites, to install nets around already existing breeding colonies and main roosting sites to limit the access of terrestrial predators, in particular, feral dogs.

A further important step would be to improve communication and cooperation between local stakeholders, in particular the salt company in Narta Lagoon, conservation authorities and NGOs. Additionally, inappropriate management of water level and water salinity for salt production, disturbances by workers/salters and the use of heavy machinery impair habitat use, the nesting and feeding activities of birds or may even directly damage breeding colonies in the salina. Therefore, a coordinated management planning to meet salt-production and conservation needs is recommended.

The KBA has also a high potential for eco-tourism with low impact on the natural environment, with access for educational or natural recreation purposes to the area controlled by the management authorities (IANKOV 2015). Finally, the development and implementation of a management plan for the KBA (including the salina) with an appropriate zonation concept will enforce synergies between conservation and the sustainable use of the area.

Acknowledgements

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5. Povzetek

Laguna Narta (59 km²) je eno največjih in najpomembnejših obalnih mokrišč za seltiev in prezimovanje vodnih ptic v Albaniji. Gnezdilke območja so slabše poznane. Cilj raziskave je bil podrobneje raziskati gnezdilke s poudarkom na vodnih pticah, oceniti njihovo številčnost, razširjenost in dejavnike ogrožanja. Območje smo popisali dvakrat – aprila in maja 2016. Pregledali smo celotno območje in obiskali vse habitate. Skupno smo opazovali 136 vrst. Ocenjujemo, da na območju gnezdi 6.400 parov 85 vrst. Najštevilčnejše gnezdilke so bile mala čigra *Sternula albifrons* s 377 gnezdečimi pari, sabljarka *Recurvirostra avosetta* s 121 in beločeli deževnik *Charadrius alexandrinus* s 96. Skupno smo opazovali še 3.461 negnezdečih osebkov, ki so pripadali 80 vrstam. Najštevilčnejši so bili beločeli deževniki s 1.100 osebki, jezerski martinci *Tringa stagnatilis* s 600, plamenci *Phoenicopterus roseus* s 321, duplinske kozarke *Tadorna tadorna* s 130, črni martinci *Tringa erythropus* s 120 in spremenljivi prodniki *Calidris alpina* s 100. Opisujemo združbe gnezdil v glavnih habitatnih tipih (soline, laguna, borovi gozdovi, kulturna krajina, skalni griči z oljčnimi nasadi in priobalna travišča z grmovjem) in glavne dejavnike ogrožanja (nedovoljen lov, daljnovidni) ter predstavljamo predloge ukrepov za pticam prijazno upravljanje območja.

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DODATEK 1 / APPENDIX 1

Supplementary figure 1: Illustration of main habitat types for birds in Narta Lagoon

Dodatna slika 1: Glavni habitatni tipi lagune Narta

(a) Salina / Soline



(b) Lagoon / Laguna



(c) Pine forests / Borov gozd



(d) Mixed farmland / Kulturna krajina



(e) Rocky hills with olive trees / Skalni griči z oljčnimi nasadi



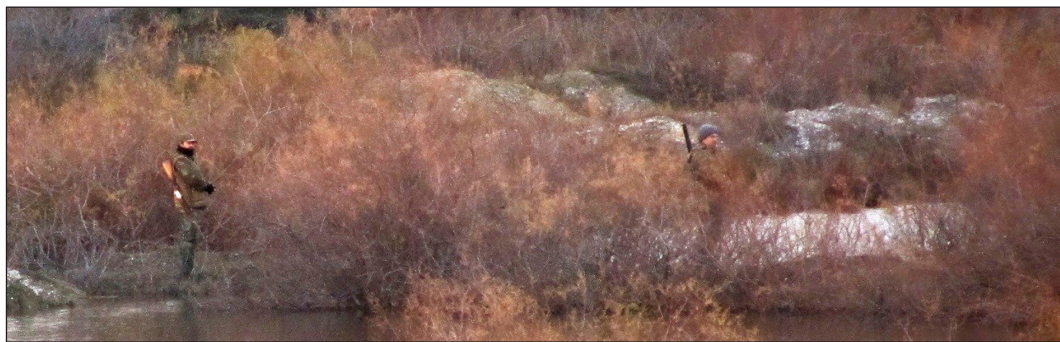
(f) Grassland with bushes near the coast / Priobalna travišča z grmovjem



Supplementary figure 2: Documented threats for birds in Narta Lagoon

Dodatna slika 2: Dokumentirane grožnje pticam v laguni Narta

(a) Poachers / Divji lovci



(b) An Audouin's Gull *Larus audouinii* with a piece of fishnet stuck to its bill / Sredozemski galeb *Larus audouinii* s kljunom ujetim v del ribiške mreže



Supplementary materials:

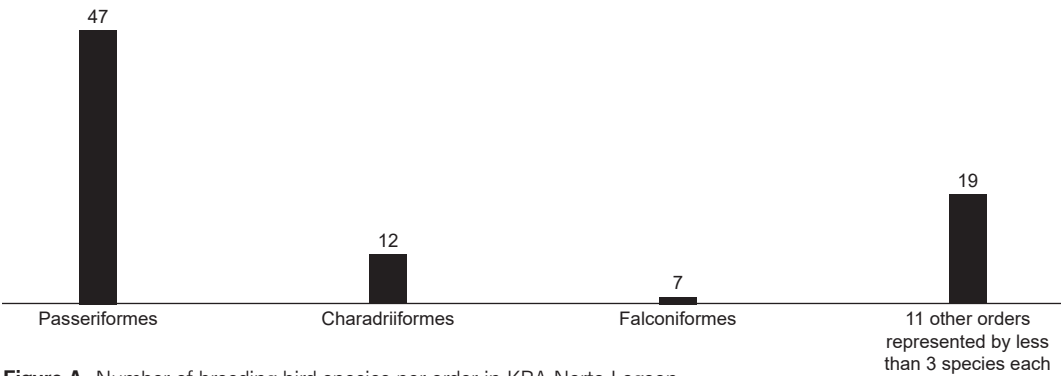


Figure A. Number of breeding bird species per order in KBA Narta Lagoon

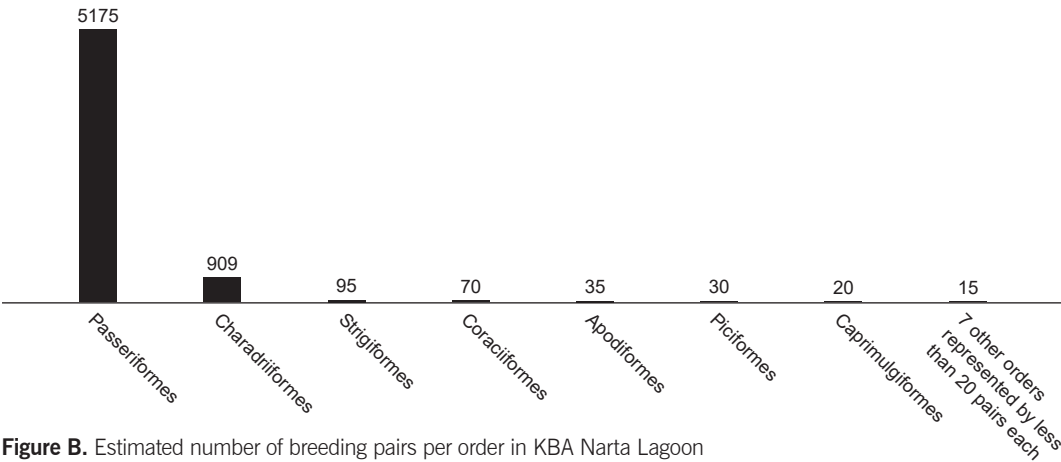


Figure B. Estimated number of breeding pairs per order in KBA Narta Lagoon

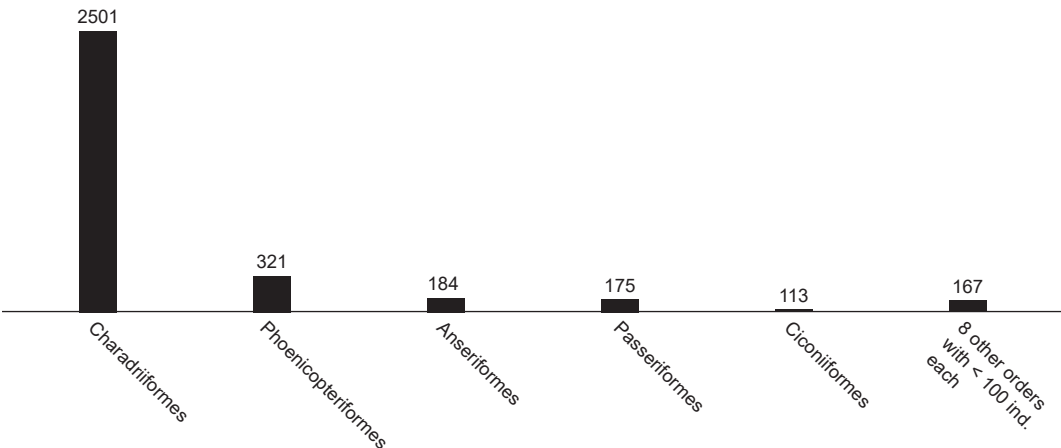


Figure C. Estimated number of migrating birds per order in KBA Narta Lagoon, expressed as the maximum number of migrating/floating individuals observed per day in Apr-May 2016