

Numbers and distribution of wintering waterbirds in the Krasnodar Province, southwestern Russia

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With extensive Sea of Azov and Black Sea coasts and inland waterbodies, the Krasnodar Province in SW Russia provides important winter quarters for waterbirds, especially in mild winters. The International Waterbird Census (IWC) was established in the region in 2003 and has been conducted annually since then except for 2007–2009. The coverage varied, depending mostly on the respective wetlands condition (frozen or not). Altogether, 37 sites were counted at least once between 2003 and 2016 with highest coverage (27 sites) in 2004. The total numbers of waterbirds varied from 145,614 in 2003 to 1,112,213 in 2013. Among individual sites, the highest number of waterbirds (353,982) was recorded in Taman Bay in 2013. Altogether, 74 species of waterbirds were identified. Most numerous species were Mallard (the highest total was 396,920 in 2013), Black-headed Gull (243,615 in 2013), Coot (147,390 in 2011), Tufted Duck (137,839 in 2014) and Pochard (106,069 in 2013). Mute and Whooper Swans, Mallard, Black-headed Gull, Tufted Duck and Pochard showed a strong or moderate increase over the period 2003–2016. Four globally threatened waterbird species were found: Dalmatian Pelican, Lesser White-fronted Goose, Red-breasted Goose and White-headed Duck. Along with mild weather, low disturbance in January is a critical factor for waterbirds to stay in the Krasnodar Province. However, infrastructure development and the construction of houses at the sea shores cause a degradation of some important wetland habitats.

Key words: waterbirds, wetlands, Krasnodar Province, IWC, counts, population trends.

1. Introduction

Most Russian wetlands normally freeze by January and therefore are not suitable for wintering waterbirds. However, extensive Sea of Azov and Black Sea coasts and inland waterbodies of the Krasnodar Province often remain free of ice, at least partially, and serve as important winter quarters for waterbirds. Starting from 2003, mid-winter waterbird counts under the International Waterbird Census (IWC) are regularly conducted in the region (SOLOKHA 2006), being included since 2012 in the national and local monitoring schemes. The information obtained from such monitoring has considerable value for hunting management and waterbird conservation in Russia. Besides, the count data are integrated into the central IWC database managed by Wetlands International and therefore contribute to estimating the sizes and trends of waterbird populations across the flyways.

The article presents the results of the IWC surveys performed in the Krasnodar Province from 2003 until 2016, except for missing seasons of 2007–2009.

2. Methods

The IWC is a site-based counting scheme for monitoring waterbird numbers. It is a so-called look-see survey whereby observers visit a site and make a count of every waterbird species present (BIBBY *et al.* 2000, DELANY 2005). We used ground and

boat surveys to count waterbirds during several days in January. The large extension of wetlands as well as the lack of experts and trained volunteers did not allow us to carry out simultaneous counts at all suitable sites in the Krasnodar Province. However, we tried to do this in as short a time as possible, particularly in the last years, and performed most counts between 10th and 25th January. We used binoculars and spotting scopes with 20–60 magnitudes for observations. Waterbirds were counted, each species separately, one by one, by tens, and, in case of large congregations, also by hundreds of individuals.

Following the methodology of the IWC in the Western Palearctic and Southwest Asia (DELANY *et al.* 1999, GILISSEN *et al.* 2002) we recorded all “traditional” waterbird species, related to such groups as divers, grebes, pelicans, cormorants, egrets, herons, bitterns, geese, swans, ducks, cranes, rails, gallinules, coot, waders, gulls and terns. The sequence of species follows the Waterbird Population Estimates – Fifth Edition (WETLANDS INTERNATIONAL 2012).

The coverage of IWC in Krasnodar Province varied, depending mostly on the condition of wetlands (frozen or not), but also from available time and funds. Altogether, 37 sites were counted at least once with highest coverage (27 sites) in 2004. No counts were conducted in January 2007–2009 due to lack of funds and organizational problems (Table 1).

The standard customized software Excel and Access were used for data collation and treatment, and a free program DIVA-GIS for mapping and spatial presentation. We calculated trends for the species that regularly winter in significant

Table 1: Summary results from mid-winter waterbird counts in Krasnodar Province since 2003. – Zusammenfassung der Ergebnisse der Mittwinter-Wasservogelzählungen in der Region Krasnodar seit 2003.

Date – Datum	Number of covered sites – Anzahl Zählgebiete	Number of waterbirds – Anzahl Wasservögel	Number of species – Anzahl Arten	Notes – Bemerkungen
2003: 18.–28.01.	20	145,614	42	
2004: 21.01.–04.02.	27	258,239	50	
2005: 13.01.–05.02.	15	206,303	44	
2006: 03.–21.01.	19	202,332	47	
2007–2009	no counts – keine Zählung	-	-	
2010: 16.–29.01.	8	156,905	34	Cold winter. Poor coverage due to lack of funds – Kalter Winter. Geringe Abdeckung wegen fehlender Finanzmittel
2011:15.–31.01	12	505,599	41	Poor coverage due to lack of funds – Geringe Abdeckung wegen fehlender Finanzmittel
2012: 20.–25.01	5	175,547	28	Poor coverage due to late counts. Cold winter – Geringe Abdeckung wegen später Zählungen. Kalter Winter.
2013: 14.–28.01	18	1,112,213	43	
2014: 12.–23.01	14	867,059	46	
2015: 14.–24.01	15	794,033	42	
2016: 13.–24.01	20	661,077	44	

numbers in the Krasnodar Province with the software TRIM 3.53 (PANNEKOEK & VAN STRIEN 2005). These species were Mute Swan *Cygnus olor*, Whooper Swan *C. cygnus*, Teal *Anas crecca*, Mallard *A. platyrhynchos*, Tufted Duck *Aythya fuligula*, Common Pochard *A. ferina*, Coot *Fulica atra*, Common Gull *Larus canus* and Black-headed Gull *L. ridibundus*.

3. Weather conditions

Weather conditions varied from winter to winter. Fig. 1 shows fluctuations of mean January temperatures from 2003 to 2016 in Krasnodar city. Overall mean January temperature in Krasnodar was 0.5°C during this period, varying between -6.6°C and 5.1°C.

Fig. 2 illustrates the change in daily average temperatures during the last five IWC seasons. Steady decline in temperature below 0°C results in freezing of wetlands. As a consequence most of the waterbirds leave the area, which was clearly seen in the last decade of January 2012. A rather opposite situation was in 2013, when after a cold December a steady increase

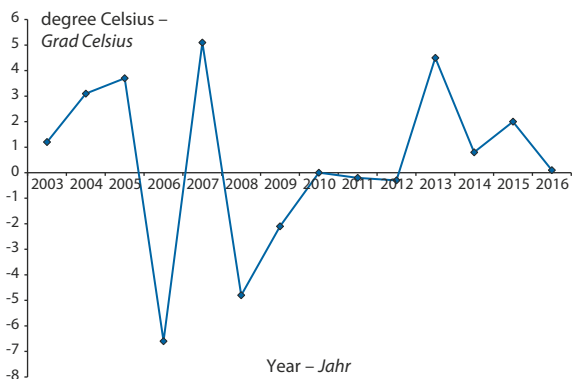


Fig. 1: Average temperatures for January 2003–2016 in Krasnodar city. Data: krasnodarmeteo.ru/archive.php. – Durchschnittstemperaturen im Januar 2003–2016 in Krasnodar.

in temperature in mid-January caused ice melting at inland waterbodies and shallow-water areas along the coasts. Subsequent warm weather led to huge numbers of waterbirds staying along the sea shores and at reservoirs until the end of winter 2013. January 2015 and 2016 were rather cold in the beginning, resulting in freezing of wetlands in the northern part of Krasnodar Province. But temperature increases in the middle of the month caused partial melting of ice cover at these wetlands by the third decade of January.

4. Results

The total counts varied from 145,614 individuals (in 2003) to 1,112,213 individuals (in 2013), while coverage ranged from five sites in 2012 to 27 sites in 2004. Out of nine sites with mean counts above 20,000 waterbirds, four sites, namely Varnava Reservoir, Taman Bay, Kryu-

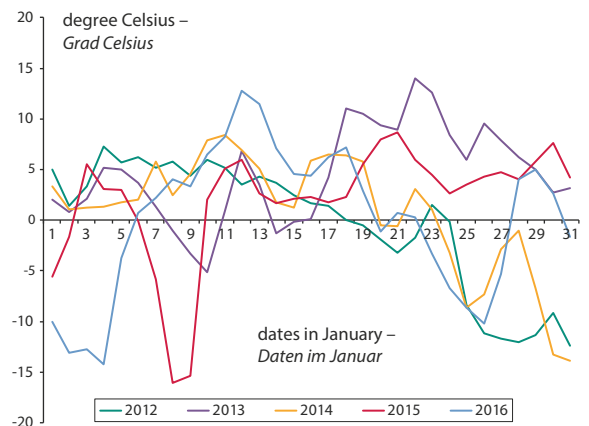


Fig. 2: Daily mean temperature in Krasnodar city for January 2012–2016. Data: krasnodarmeteo.ru/archive.php. – Tagesmitteltemperatur in Krasnodar im Januar 2012–2016.

kovo Reservoir and Kiziltash limans, were particularly important and supporting, on average, 100,328, 87,575, 81,453 and 77,470 waterbirds respectively (Fig. 3). The highest number of waterbirds (353,982) was recorded in Taman Bay in 2013.

Altogether, 74 species of waterbirds were identified during 2003–2016 in the Krasnodar Province. The lowest number of species (28) was found in 2012, and the highest number (50) in 2004. Most numerous were Mallard (highest total count was 396,920 in 2013), Black-headed Gull (243,615 in 2013), Coot (147,390 in 2011), Tufted Duck (137,839 in 2014) and Pochard (106,069 in 2013). The characteristics of particular groups are listed below.

Divers and grebes

Over the whole period we counted two species of divers and four species of grebes. While Red-throated Diver *Gavia stellata* was found only once (one flock of 47 birds at Varnava Reservoir in 2014), the Black-throated Diver *G. arctica* occurred during eight winter seasons along the Black Sea shores with totals varying from one in 2011 to 2,443 individuals in 2013. In the last case divers concentrated in the Bolshoi Utrish Cove.

Among grebes the Great Crested Grebe *Podiceps cristatus* was most widespread and numerous with totals varying from four birds in 2012 to 36,698 birds in 2015. The majority of them was found along the Black Sea coast in the Anapa Bay and Bolshoi Utrish Cove.

Pelicans and cormorants

Dalmatian Pelican *Pelicanus onocrotalus* was found every winter with total counts from three in 2010 to 111 in 2015. Over the last years pelicans occurred mostly in Novorossisk Bay (the Black Sea) and Temryuk Bay (Sea of Azov).

Two species of cormorants were counted in Krasnodar Province in mid-winter seasons of 2003–2016. Pygmy Cormorant *Phalacrocorax pygmeus* was relatively scarce and found not every winter, with highest count of 575 birds in 2004. Great Cormorant *P. carbo* was numerous and widespread with total counts varying from 2,682 (2013) to 29,628 birds (2014).

Egrets, herons and bitterns

Both Grey Heron *Ardea cinerea* and Great White Egret *Casmerodius albus* were counted every winter. The first species was recorded in numbers from 40 (2006) to 839 (2011), mostly at the Varnava Reservoir and Taman Bay. Great White Egret numbers varied from eight (2010) to 1,919 (2011) birds, and highest numbers were counted around Taman Bay and Kiziltash limans. Single individuals of Little Egret *E. garzetta* and Bittern *Botaurus*

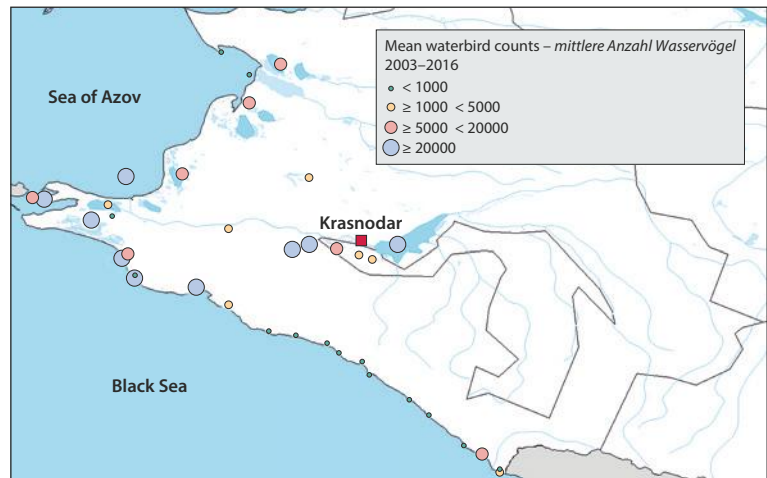


Fig. 3: IWC sites in Krasnodar Province in 2003–2016. Dots indicate mean numbers of waterbirds counted. – *Zählgebiete der Internationalen Wasservogelzählung in der Region Krasnodar von 2003–2016. Die Punkte zeigen die mittlere Anzahl erfasster Wasservögel.*

stellaris occurred just in some winters, up to seven and eight birds per year, respectively.

Swans

We counted three species of swans in the period 2003–2016. They occupied in total 21 sites, of which the Taman Bay was the most important (highest swan number was 4,779 birds in 2016). Mute Swan was found every winter season, and, in total, it occupied 20 sites varying from three sites in 2010 to twelve sites in 2004, 2006, 2015 and 2016. The total counts differed from 481 in 2010 to 6,994 individuals in 2015, with means of $2,875 \pm 624$ birds per year. Numbers showed a moderate increase over the whole period ($p < 0.01$; slope model 1.0794 and std. err. 0.0266) (Fig. 4).

Whooper Swan was recorded every winter season, and in total it occurred at 14 sites, varying from two sites in 2005 and 2010 to ten sites in 2016. The total counts differed from 296 in 2012 to 2,560 birds in 2014 (mean 962 ± 225 birds per year). The overall trend showed a moderate increase ($p < 0.01$; slope model 1.0749 and std. err. 0.0247, Fig. 4).

Bewick's Swan *Cygnus bewickii* was firstly found in the region in January-February 2008, when two to five birds were seen in Kerch Strait and neighboring part of Taman Bay (MNAATSEKANOVA 2008). We recorded this species every January since 2013, and until 2016 its number varied from two (in 2015) to 139 (in 2013). It occurred at three sites, namely Varnava Reservoir (the highest count was 101 birds in 2013), Taman Bay (the highest count was 57 birds in 2014) and Krasnodar Reservoir (only in 2013, 18 birds).

Geese

Four species of geese were found in the seasons of 2003–2016, namely White-fronted Goose *Anser albifrons*, Lesser White-fronted Goose *A. erythropus*, Greylag

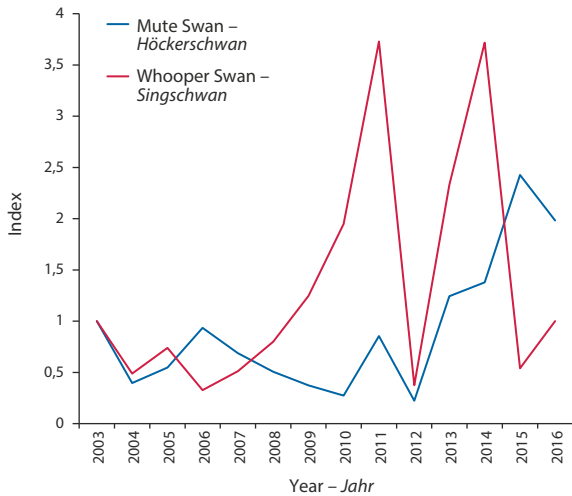


Fig. 4: Trends of Mute and Whooper Swan wintering numbers in the Krasnodar Province 2003–2016. – *Indexentwicklung überwinternder Höcker- und Singschwäne in der Region Krasnodar 2003–2016.*

Goose *A. anser* and Red-breasted Goose *Branta ruficollis*. White-fronted and Greylag Geese have been common and counted every winter season. Their totals strongly fluctuated between years being affected by weather conditions and coverage. Totals changed from two (2003, 2010) to 4,869 (2013) individuals, and from 133 (2010) to 10,427 (2013) individuals, respectively. Varnava Reservoir was the most important wintering site for these species (e.g. in 2013 it hosted 4,473 White-fronted and 7,020 Greylag Geese). Lesser White-fronted Goose appeared just once over the whole count period: two birds were recorded in the vicinity of Taman Bay in 2013. Red-breasted Goose was counted in 2006 (13 birds at Kiziltash limans and two birds at Krasnodar Reservoir) and in 2016 (two birds in Imeretinsky Lowland; LEV SHAGAROV, pers. comm.)

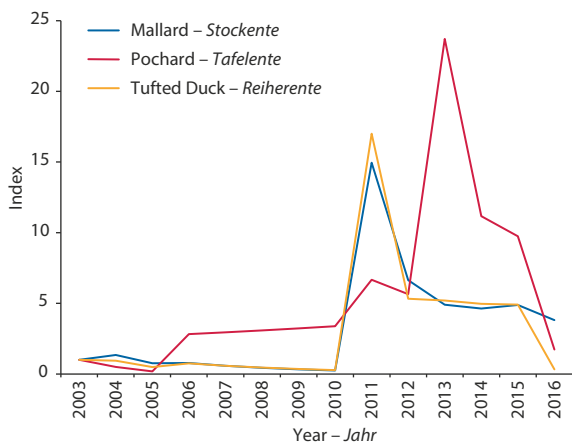


Fig. 5: Trends of the wintering numbers of Mallard, Pochard and Tufted Duck in the Krasnodar Province 2003–2016. – *Indexentwicklung überwinternder Stock-, Tafel- und Reiherenten in der Region Krasnodar 2003–2016.*

Ducks and Coot

Over the whole period we counted 19 species of ducks, including two species of shelducks, seven species of dabbling ducks and ten species of diving ducks (*Netta rufina*, *Aythya sp.* *Mergus sp.* and others). Teal, Mallard, Pochard and Tufted Duck were the most numerous and widespread species and occurred every year. We calculated trends for these species, and also for Coot.

Teal held itself over the whole period at 20 sites, varying between one site in 2010 and nine sites in 2006. The total counts differed from 249 birds in 2010 to 56,250 birds in 2011, with a mean of $7,784 \pm 4,919$ birds per year. Teal showed poorly known (uncertain) trend skewing toward increase (slope model 1.3615 and std. err. 0.1986).

Mallard occupied in total 26 sites, varying from five in 2012 to 18 sites in 2004. The total counts fluctuated from 9,567 birds in 2010 to 396,920 birds in 2013, with a mean of $184,465 \pm 47,337$ birds per year. The species trend was classified as “strong increase” ($p < 0.01$; slope model 1.2007 and std. err. 0.0322) (Fig. 5).

Pochard occurred at 22 sites, varying from two in 2010 to eleven sites in 2013 and 2016. The total counts differed from 867 birds in 2005 to 106,069 birds in 2013 (mean $28,177 \pm 9,511$ birds per year). The species showed strong increase in number ($p < 0.05$; slope model 1.2382 and std. err. 0.0890) (Fig. 5).

Tufted Duck occupied 21 sites, varying from two sites in 2010 to eleven sites in 2003 and 2015. The total counts differed from 9,327 birds in 2011 to 137,839 birds in 2014, in the mean $45,564 \pm 13,089$ birds per year. The species showed a strong increase ($p < 0.05$; slope model 1.1406 and std. err. 0.0379) (Fig. 5).

Coot was also found every year and at many sites in Krasnodar province. It occupied 23 sites, varying from four sites in 2012 to 15 sites in 2004. The total counts differed from 5,397 birds in 2016 to 147,390 birds in 2011, in the mean $35,240 \pm 12,585$ birds per year. The trend was classified as “uncertain” but skewed towards decline (slope model 0.9308 and std. err. 0.0374) (Fig. 6).

Waders

In general, waders were uncommon wintering birds in Krasnodar Province. Among 19 recorded species, Curlew *Numenius arquata* was the most numerous and occurred every year, primarily at Kiziltash limans (from four to 175 individuals in different years). An interesting finding was a Purple Sandpiper *Calidris maritima* in Novorossiisk Bay in 2016, the first documented record of this species in the region (LOKHMAN & SOLOKHA 2016).

Gulls and terns

Nine species of gulls and three species of terns were recorded in January 2013–2016. Of them Common Gull, Caspian Gull *L. cachinnans* and Black-headed Gull were the most numerous and widespread species that occurred every year. We calculated population trends for two species and give details below.

Common Gull occurred at 29 sites, between two in 2012 and 24 sites in 2004. The total counts differed from 201 birds in 2012 to 27,223 birds in 2013 (mean $7,566 \pm 2,608$ birds per year). Overall trend was “uncertain” but skewed towards increase (slope model 1.1225 and std. err. 0.0753).

Black-headed Gull was found at 26 sites, varying from two sites in 2010 and 2011 to 14 sites in 2004 and 2006. The totals heavily fluctuated from 88 birds (in 2010) to 243,615 birds (in 2013) which could be the consequence of differences in count coverage. Over the last years the largest concentrations were found along the Black Sea shore between Anapa Bay and Novorossiisk Bay. Mean count during 2003–2016 was $64,127 \pm 24,687$ birds. An overall “uncertain” trend was skewed towards increase (slope model 1.7921 and std. err. 0.05906).

Terns were rare in January. Sandwich Tern *Sterna sandvicensis* was the only species to occur almost every winter, primarily in the Novorossiisk Bay, with totals of up to 32 individuals.

Globally threatened waterbirds

Four IUCN Red List (BIRDLIFE INTERNATIONAL 2016) and RUSSIAN RED DATA BOOK (2001) waterbird species were counted during the counts 2003–2016, namely Dalmatian Pelican, Lesser White-fronted Goose, Red-breasted Goose, and also White-headed Duck *Oxyura leucocephala*. The latter species was found in 2013 (five in Kerch Strait and ten individuals in Anapa wetlands) and in 2014 (two birds in Taman Bay).

5. Discussion

Count data varied from year to year depending primarily on conditions of waterbodies (frozen or not) and also on available funds for field trips. During the last five years the lowest number of waterbirds was counted in January 2012 (175,545 birds) and this can be explained by the fact that the counts were relatively late (after 20th January) and affected by a sharp drop in temperature. The highest total (1,112,213 birds) was counted in the mild January of 2013. In January 2016, fog hampered counts in Taman Bay and is likely to have caused an underestimation of swans.

Wintering numbers of Mute and Whooper Swans, Mallard, Pochard and Tufted Duck demonstrated strong or moderate increases from 2003 to 2016. Also numbers of Teal, Common and Black-headed Gulls were increasing to some extent, but with uncertain trends. On the other hand, counts indicated a slight decrease in wintering numbers of Coot. Our results, however, do not correspond to the overall declining trends (between 2002–2012) for Black Sea and Mediterranean (wintering) populations of Pochard and Tufted Duck (NAGY *et al.* 2014). The reason for the difference might be that data from Krasnodar sites, with high counts of both species in 2013, 2014 and 2015, have not been included in the overall trend calculation. For several species, signifi-

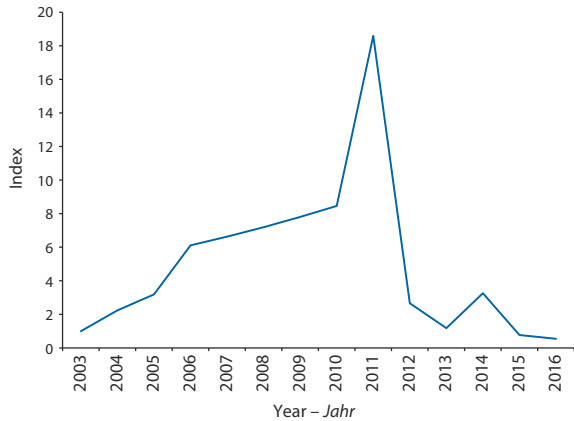


Fig. 6: Trend of the Coot wintering numbers in the Krasnodar Province 2003–2016. – *Indexentwicklung überwinternder Blässhühner in der Region Krasnodar 2003–2016.*

cant proportions of the Black Sea and Mediterranean flyway populations were counted in Krasnodar Province. NAGY *et al.* (2015) estimated the numbers of the relevant flyway populations of Mute Swan at 45,000 individuals, Whooper Swan at 14,000 individuals, Mallard at 1,500,000 individuals, Pochard at 570,000–630,000 individuals and Tufted Duck at 400,000–500,000 individuals. Our results suggest that, at least in some years, Krasnodar Province hosts about 16 % of Mute Swan, 18 % of Whooper Swan, 25 % of Mallard, 16 % of Pochard and 30 % of Tufted Duck flyway populations.

In recent years we counted large numbers of non-identified diving ducks in the Taman Bay, e. g. 53,000 birds in 2013, 23,000 birds in 2015, and 45,000 birds in 2016. These flocks, mostly of Pochards and Tufted Ducks, were concentrated three and more kilometers from the shore and, despite using the best vantage point (lighthouse) and a spotting scope, we were unable, except in January 2014, to identify and count the species separately. Therefore, actual numbers of wintering Pochard and Tufted Duck can be even higher than listed in our report.

Diverse types of vast natural and artificial wetland habitats, as well as agricultural fields of Krasnodar Province can provide good roosting and feeding conditions for wintering swans, geese, ducks and other waterbirds. After waterfowl hunting closing on 31st December, disturbance is relatively low, and mild weather becomes an important factor for wintering waterbirds to concentrate in the area. However, the construction of houses and infrastructure development at the sea coasts lead to the destruction of some important wetland sites and therefore pose serious threats on wintering waterbirds.

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6. Zusammenfassung

Solokha, A. & Y. Lokhman 2017: Bestände und Verbreitung überwinternder Wasservögel in der Provinz Krasnodar, Südwest-Russland. Vogelwelt 137: 156–161.

Die Region Krasnodar umfasst große Küstenbereiche des Schwarzen und Asowschen Meeres sowie eine Vielzahl von Binnengewässern die, gerade in milden Wintern, ein wichtiges Überwinterungsgebiet für Wasservögel darstellen. Seit 2003 beteiligt sich die Region an der International Waterbird Census (IWC), die – mit Ausnahme der Jahre 2007–2009 – seither jährlich durchgeführt wird. Die Zählgebietsabdeckung variiert und ist in erster Linie von der Verfügbarkeit der Feuchtgebiete für Wasservögel abhängig (ob diese zugefroren sind oder nicht). Insgesamt wurden 37 Zählgebiete zumindest einmal zwischen 2003 und 2016 gezählt. Die Zählungen wurden vom Festland oder Boot durchgeführt. Wegen der geringen Anzahl an qualifizierten Zählern und der Vielzahl an Feuchtgebieten bzw. relevanter Wasserflächen konnte bisher keine simultane Erfassung in allen Zählgebieten stattfinden. Der Zeitraum für die jährlichen Zählungen wurde jedoch so kurz wie möglich gehalten, mit dem Ziel alle Gebiet jeweils zwischen dem 10. und 25. Januar eines Jahres zu erfassen. Die größte Abdeckung wurde 2004 mit 27 Zählgebieten erreicht. Die Gesamtzahl der erfassten

Wasservögel variierte zwischen 145.614 Individuen im Jahr 2003 und 1.112.213 Individuen 2013. Der höchste Bestand in einem einzelnen Zählgebiet (353.982 Ind.) wurde 2013 in der Taman Bucht erfasst. Insgesamt wurden im Rahmen der Zählungen bisher 74 Wasservogelarten festgestellt. Die häufigsten Arten waren dabei Stockente (höchster Gesamtbestand 396.920 Individuen im Jahr 2013), Lachmöwe (243.615 Ind., 2013), Blässhuhn (147.390 Ind., 2011), Reiherente (137.839 Ind., 2014) und Tafelente (106.069 Ind., 2013). Höcker- und Singschwan, Stockente, Lachmöwe, Reiherente und Tafelente zeigten starke oder moderate Zunahmen über den Zeitraum 2003–2016. Unter den überwinternden Wasservögeln waren auch vier weltweit als gefährdet eingestufte Arten (Krauskopfpelikan, Zwerggans, Rothalsgans, Weißkopf-Ruderente). Neben mildem Wetter ist insbesondere ein geringes Störungsniveau im Januar ein kritischer Faktor im Hinblick darauf, ob Wasservögel längerfristig in der Region Krasnodar verweilen. Leider kommt es durch zunehmende Infrastrukturentwicklung und den Neubau von Häusern entlang der Küste zur Degradierung einiger wichtiger Überwinterungshabitate.

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