

AVIATION SAFETY RANKING VALUES AND BIRD SPECIES AT TRABZON INTERNATIONAL AIRPORT, TÜRKIYE

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The study investigated bird species at Trabzon International Airport (TIA) in Türkiye and their Aviation Safety Ranking Values (ASRV). During the study period between February 2021 and February 2022, 75 observations were carried out using direct and indirect observation methods (camera traps, bird nests, eggs, feathers and pellets) to identify species. As a result, 109 bird species were identified belonging to 39 families. Migration status of the observed birds ranged from overwintering (27), to summer visitors (26), residents (17), wintering and passage migrants (14), passage migrants (9), residents and wintering (8), residents and summer visitors (5), and residents and passage migrants (3). The bird hazard ranking system is based on bird size, average weights, flocking characteristics, and flight behaviour. According to the criteria of the ASRV, a total of 36 bird species at TIA with hazard levels of intermediate (3), high (4), and very high (5) were determined. Among the species identified, 25 weighed between 700 and 2200 grams. Wildlife professionals should be assigned to all airports to successfully control bird strikes and increase flight safety, and bird observations should be performed regularly.

Key words: bird strike, flight safety, ASRV, bird observation, airport.

INTRODUCTION

As air traffic shares the sky with birds, the mutual risks to aircraft and birds is increasing. With heavy air traffic, there has been an increasing rate of collisions between planes and birds. These collisions threaten both human life and birdlife and cause severe economic damage to aircrafts. Bird strikes cause deaths worldwide and a significant economic loss estimated at an average cost of approximately 1.2 billion dollars per year (ALLAN 2002). The European Union Aviation Safety Agency (EASA) has determined the average cost of bird strikes in the civil aviation sector in Europe to be about 1 billion Euros per year (MARAGAKIS 2009). As air transportation has gained significant momentum, the necessity of controlling wildlife that threatens flight safety has increased significantly.

Birds cause the most accidents and malfunctions in air traffic among wild animals. Around the world, nearly 450 people and thousands of birds have lost their lives due to bird strikes, and severe economic damage has been

inflicted on 180 civil aircrafts and nearly 500 military aircraft (SHOBAKIN 2009). Between 1960 and 2004, 255 civilians and thousands of birds died due to bird strikes worldwide, and serious economic losses occurred in 122 civilian aircrafts. Over 150 military personnel lost their lives in the same period due to bird strikes, and nearly 350 military aircrafts were destroyed (SHOBAKIN 2009). The International Civil Aviation Organization (ICAO) states that nearly 90% of bird strikes occur during landing or take-off (ICAO 2018). During these phases, the engines run at maximum power, causing mass deaths at low altitudes (DUKIYA & GAHLOT 2013). Green areas, rocks, and runway lighting at night, all of which are preferred by birds, are very attractive for both migratory species and resident birds (MALLORD *et al.* 2007). Since airports are the preferred habitats of birds with their food sources, this leads to flight safety problems. The green areas along the runway and around the airport that birds prefer effectively attract birds (ICAO 1987, ROBINSON 2005). The bird species most often encountered at airports are mainly herbivores/seed eaters (ducks, geese, and some sparrow species), insectivorous species, corvids, and gulls. There may also be raptors and herons, depending on the presence of amphibians or small mammals (BARRAS & DOLBEER 2000, GLEIZER *et al.* 2005). One factor increasing the potential risks to flight safety is when the airports are located on bird migration routes. Despite preventive efforts at airports, the risk of bird strikes still cannot be eliminated (BLOKPOEL 1976). Besides, the width of bird migration routes makes it difficult to take some measures.

In the last 15 years, the number of passengers in civil air transport has increased by 261% worldwide, the number of passengers increased from 1.46 billion to 3.8 billion (ICAO 2018). In Türkiye, 33.5 million passengers used air transport from 2002 to 2008, and this number was 193.3 million in 2017 alone. The number of aircrafts grew from 150 in 2002, 270 in 2008, 422 in 2013, and 645 in 2017 (DGCA 2017).

Despite the increasing number of studies on birds in Türkiye, there is still insufficient scientific monitoring or data on birds and flight safety. The Eastern Black Sea Region contains many different habitats for nearly 340 bird species that have been identified so far (KAHRAMAN *et al.* 2016). BAŞKAYA (1994) conducted a study on migratory bird species in the Eastern Black Sea Region, and GÜLCİ (2011) investigated the effects of birds on flight safety at TIA.

The bird hazard ranking system is based on bird size and average weights, flocking characteristics, and flight behaviour. The morphological characteristics of birds should be known for effective control. This paper presents bird species occurring at TIA in Türkiye and their Aviation Safety Ranking Values (ASRV).

MATERIAL AND METHODS

During on-site direct information collection process, binoculars (10×42) and telescopes (20–60×) of various brands were used. To photograph the periodical status of the area and the species seen during the field observations, various models of digital and video cameras were used. To identify the species, body sizes, and average weights of the birds observed during the field study, we used reference works (JONNISON 2006, HEINZEL *et al.* 1995, KIZIROĞLU 2009). For species that were difficult to identify, we recorded the appearance, behaviours, and other helpful information (photograph, time of presence, etc.) in detail and then evaluated and clarified them. Areas in the airport with a high density of birds were identified, and 10 camera traps were installed to obtain photographs and video images of birds. For placing them in suitable areas, we used 10 specially prepared wooden sticks of 50 cm in length and 5 cm in thickness and used galvanised thin iron wires and pliers for fixing. We also used a small sickle to cut all kinds of grass, branches, and leaves at up to 10 meters from the cameras, which may have caused the devices to shoot continuously and hamper their battery life.

Study area

The phases of bird strikes are classified as take-off run, initial climb, climb, en-route, descent, manoeuvre, initial approach, final approach, and landing (FAA, 2010). Accordingly, 48% of bird strikes occur during the climb, 30% during the approach, 15% during en-route flight, and 6% during descent (MARAGAKIS 2009). Most bird strikes occur during the initial approach and climb phases (ICAO 2012; DGCA, 2016). As these phases take place near the airports, we carried out our field studies over a 3.5 km² area, including TIA and its surroundings, up to a 1 km radius. To create a land-use map of the airport and its



Fig. 1. Study area (GOOGLE EARTH, 2022)

surroundings for the areas that were extensively used by birds, we used Google Earth satellite images (GOOGLE EARTH 2022) (Fig. 1). While detecting the bird species, we also made observations around the seaside parts in the northern part of the airport.

Bird observations

We conducted the study between February 2021 and February 2022 by direct observations and applying indirect data collection methods (camera traps, searching for and identifying bird nests, eggs, feathers, pellets in order to identify the bird species occurring in the study area). While making direct observations, the research teams were located at least 1 km away from each other, on towers within the airport, and in areas that would not endanger flight safety. During the study, we made at least 2 surveys each month. These observations were carried out at the airport periodically every season with a total of 75 observation periods. In this way, we found out which species visited the research area in which month and on which days. During the observations, we recorded the observation site, date, time, and migration status in detail. We used the following categories for the species: resident (R) for those observed throughout the year, wintering (W) for those observed during winter, summer visitor (SV) for those observed during summer, and passage migrant (PM) for those that did not incubate in the area but used the area for migration. After direct observations in the first two months (February–March), we placed 10 camera traps in these areas and recorded the species and group sizes of the birds. We planned the observations in coordination with the airport authorities and took the necessary measures not to endanger flight safety.

Determining aviation safety ranking values

The birds were evaluated in terms of body size, migration status, and weight based on the Aviation Safety Ranking Values (ASRV) accepted by the International Bird Strike Committee (IBSC 2002). The bird hazard ranking system is based on bird size (average weights), flocking characteristics, and flight behaviour. Obviously, large birds cause more damage than smaller birds. Weight is more important than overall size because the mass and density

Table 1. Threat ranking and aviation safety ranking values (IBSC 2002).

Severity of risk	Species characteristics	Illustrative species
Level 1	Small (50–300 gr), solitary	
	Very small (<50 gr), solitary and flocking	Eastern meadowlark, swallows
Level 2	Moderate (300–1000 gr), solitary	
	Small (50–300 gr), flocking	European starling
Level 3	Large (1–1.8 kg), solitary	
	Moderate (300–1000 gr), flocking	Red-tailed hawk, American crow
Level 4	Very large (>1.8 kg), solitary	
	Large (1–1.8 kg), flocking	Vultures, mallards, great black-backed gulls
Level 5	Very large (>1.8 kg), flocking	Geese, cranes, cormorants

ASRV: 1. without significant relevance for air traffic safety, 2. low potential danger, 3. intermediate potential danger, 4. high potential danger, 5. very high potential danger

of the bird determine actual damage (IBSC 2002). IBSC groups birds into five levels according to their potential hazards when they hit an aircraft (Table 1). In this table, birds are also evaluated based on weight and other conditions like being solitary or flocking. Hence, the results section includes separate threat classes according to the birds being solitary or flocking.

Also, according to the internationally accepted approach, the birds were classified based on their body size as small (S) (5-25 cm), medium (M) (25.1–39.9 cm), and large (L) (over 40 cm) (MORGENROTH 2003).

RESULTS

In the study, we identified 109 bird species belonging to 39 families. Figure 2 describes the migration status of the observed birds. We established that a bird species might be categorised into more than one migration status, as some species can show different migratory behaviours.

There were 25 bird species weighing between 700 and 2200 grams in and around the airport. These were the red-throated loon, arctic loon, great crested grebe, great cormorant, European shag, pygmy cormorant, great egret, gray heron, white stork, Eurasian wigeon, northern pintail, red-crested pochard, common pochard, tufted duck, mallard, black kite, red kite, common buzzard, long-legged buzzard, booted eagle, peregrine falcon, common coot, lesser black-backed gull, yellow-legged gull, and raven. Among these species, there are 10 resident species weighing 700 grams or more. These are cormorant, European shag, great crested grebe, mallard, common buzzard, long-legged buzzard, common coot, lesser black-backed gull, yellow-legged gull, and raven. The carrion crow and the rock dove, weighing less than 700 grams, also heavily use the airport throughout the year, and among the migratory species under 700 grams that use the airport for temporary accommodation, little

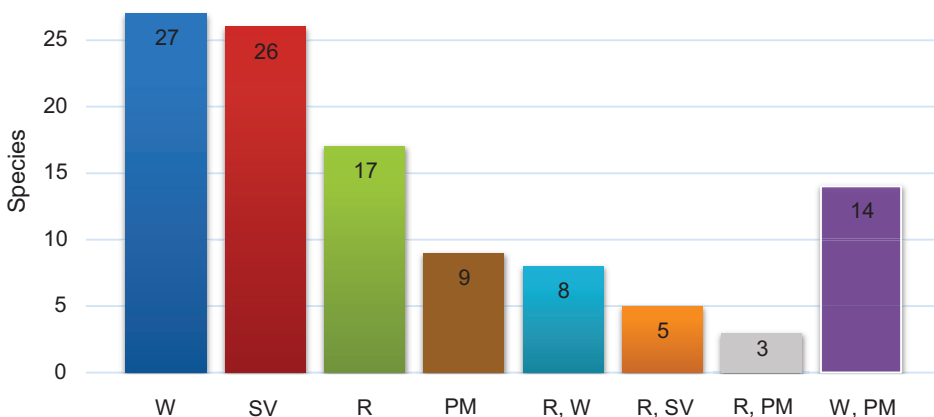


Fig. 2. Migration status of the detected bird species at Trabzon International Airport. Abbreviations: W = wintering, SV = summer visitor, R = resident, PM = passage migrant

egret, common quail, Eurasian golden plover, northern lapwing, ruff, Eurasian woodcock, black-tailed godwit, common redshank, common greenshank, green sandpiper, common sandpiper, black-headed gull, mew gull, sandwich tern, and common tern. These species were found in groups of 20-60, and any of these flocks striking a moving aircraft would threaten flight safety.

According to the Aviation Safety Ranking Values (ASRV) classification, there were 36 bird species at TIA with threat levels of moderate (3), high (4), and very high (5) (Appendix). Also, according to the criteria set by the International Union for Conservation of Nature (IUCN 2022), 3 of the species identified here were endangered (Appendix). These were the common pochard, red-footed falcon, and European turtle dove. These three species were not resident to the study area and were among the migrating birds.

TIA has some very attractive areas for feeding and accommodation with its green areas, woodlands, sea cliffs, and runway lighting for birds. Besides, the open drainage canals and all other areas with temporary or permanent water cover in the airport also attract birds. Yellow-legged gulls, a great threat to flight safety both solitary and in flocks, were often seen in flight in the area. For accommodation, these birds prefer the roofs of buildings in and around the airport, the green areas with sparse but rather short grasses, mostly asphalt and concrete surfaces, and, individually, electric poles. As the grass grows in the area, the number of gulls in the green areas significantly decreases. In these areas, we observed no gulls during the periods when the grass was tall. Yellow-legged gulls fly in groups of 20-100 over the airport at low altitudes, particularly in cloudy weather. This low-altitude displacement poses a threat to aircraft take-offs and landings. We observed that during such times of cloudy weather, the yellow-legged gulls accommodate around the green areas covered with short grass or the asphalt and concrete floors in the airport when they are not flying.

Other resident bird species, mainly carrion crows and rock pigeons, were present in the green areas on the west side of the runway. Some resident species, like the carrion crows, were observed in the airport, on leafy tree species, in groups of 100. This low-altitude displacement poses a threat during aircraft take-offs and landings. In this area, rock doves used the roofs of buildings for accommodation. We observed that yellow-legged gulls and carrion crows often left some food materials (snails, fruit residues, etc.), waste materials (plastic bottles, caps, bags, etc.), branches, bushes, and leaves that they collected from the environment and the sea on the runway. These materials can pose a risk to flight safety. Besides, the electronic devices that are extremely important for flight safety at TIA, building roofs, power poles, wooden fences, lighting devices, plastic bollards, and antennas offer temporary roosting sites for both local and migratory bird species.

The camera traps were left on-site throughout the study period, and they photographed many bird species while landing or flying. 19 bird species in

the area were photographed and identified only by the camera traps. Also, we detected domestic cats (*Felis catus*) and golden jackals (*Canis aureus*), two mammal species, which may have a negative impact on flight safety. Of these species, the cat was observed at all day hours, and the golden jackal only appeared in the dark. The first image of the golden jackal was taken in April, after which we investigated where it entered the field and what paths it used. We concluded that the golden jackal entered the field using the garbage dump on the seaside of the airport. This issue and the necessity to take precautions were explained to the airport authorities. After May, we saw no image of the golden jackal until the end of the study.

DISCUSSION

The Eastern Black Sea Region contains various habitats for the nearly 340 bird species that have been identified so far (KAHRAMAN *et al.* 2016). Although, we could not observe 38 of the 123 bird species identified by the direct observations of GÜLCİ (2011), who included the project area and the surrounding areas with a diameter of 13 kilometres. These species were the great white pelican (*Pelecanus onocrotalus*), Eurasian bittern (*Botaurus stellaris*), squacco heron (*Ardeola ralloides*), purple heron (*Ardea purpurea*), whooper swan (*Cygnus cygnus*), greater white-fronted goose (*Anser albifrons*), greylag goose (*Anser anser*), common shelduck (*Tadorna tadorna*), common teal (*Anas crecca*), garganey (*Spatula querquedula*), marbled teal (*Marmaronetta angustirostris*), smew (*Mergus albellus*), European honey-buzzard (*Pernis apivorus*), short-toed snake-eagle (*Circaetus gallicus*), Levant sparrowhawk (*Accipiter brevipes*), rough-legged buzzard (*Buteo lagopus*), saker falcon (*Falco cherrug*), Osprey (*Pandion haliaetus*), common moorhen (*Gallinula chloropus*), common crane (*Grus grus*), pied avocet (*Recurvirostra avosetta*), Pallas's gull (*Larus ichthyaetus*), Mediterranean gull (*Larus melanocephalus*), great black-backed gull (*Larus marinus*), common barn owl (*Tyto alba*), short-eared owl (*Asio flammeus*), alpine swift (*Tachymarptis melba*), Eurasian wryneck (*Jynx torquilla*), woodlark (*Lullula arborea*), Eurasian crag martin (*Ptyonoprogne rupestris*), grey wagtail (*Motacilla cinerea*), mistle thrush (*Turdus viscivorus*), Sardinian warbler (*Curruca melanocephala*), red-breasted flycatcher (*Ficedula parva*), European pied flycatcher (*Ficedula hypoleuca*), Eurasian jackdaw (*Corvus monedula*), Eurasian siskin (*Spinus spinus*), and rock bunting (*Emberiza cia*). Also, 24 bird species that we detected in the area were not recorded by GÜLCİ (2011). These were the black-necked grebe, white stork, Eurasian wigeon, booted eagle, hen harrier, Montagu's harrier, Eurasian sparrowhawk, Eurasian thick-knee, collared pratincole, kentish plover, Eurasian golden plover, mew gull, common tern, European turtle dove, laughing dove, European nightjar, crested lark, whinchat, olivaceous warbler, yellowhammer, black-headed bunting, corn bunting, great grey shrike, and lesser grey shrike.

An average passenger aircraft (Boeing 737NG, Airbus A320-200) takes off at a speed of 260–330 km/h (140–180 knots) and lands at a speed of 220–250 km/h (120–135 knots). For aircrafts with wider bodies, these numbers may be slightly higher. According to research data, bird strikes are mostly seen at 0–200 meters altitudes. Still, migratory birds flying at very high altitudes can also damage aircrafts. A 6-kg bird can have an impact equivalent to a force of 550 kg on an airplane travelling at 300 kilometres per hour, and a 1-kg bird has a force of approximately 100 kg. The relevant research found that pilot windows were damaged during a bird strike involving a 1.8 kg bird and an airplane travelling at 375 km/h (HEDENSTRÖM 1993, ZHU *et al.* 2009, WALVEKAR *et al.* 2012). Other studies also indicate that every bird that weighs 700 gr or more is a threat to flight safety (HEDENSTRÖM 1993, ZHU *et al.* 2009, WALVEKAR *et al.* 2012, ÇOBAN & BAHAR 2018). Even lighter birds can be a threat to flight safety when they are in a flock. We observed 24 bird species weighing 700 grams or more in our project in and around TIA.

CONCLUSION

Airports should appoint qualified personnel trained in the field to reduce the occurrences of bird strikes. For this purpose, wildlife-controlling units should be established. Bird observations should be made in all seasons. Grass control should be performed continuously during migration periods. Some studies state that thorny bushes and other difficult vegetation prevent birds from nesting and hiding at airports (HARRISON *et al.* 1984, DESOKY 2014). The soil characteristics at the airport should be considered, and airports should use thorny species that could be a food source for bird species and reduce the number of insects. Authorities should place inexpensive and easy-to-apply plastic asparagus wires, which should not adversely affect flight safety, on all structures that birds use during their temporary stay (electronic devices, building roofs on campus, power poles, wooden fences, lighting devices, plastic bollards, and antennas). We observed many coniferous and leafy tree species at TIA, which resident birds used for roosting and nesting. During the study, we detected solitary birds on the tops, branches, and interior parts of these coniferous trees. However, there were more than 100 groups of birds in leafy trees. Thus, before the vegetation period begins, airport authorities should contact the relevant public institution (General Directorate of Forestry, Trabzon Regional Directorate) to cut down all leafy trees against bird strikes. We observed that birds formed large groups around the open drainage canals in the airport and all areas that caused water accumulation. Thus, it is necessary to cover the open drainage canals inside the airport and to identify and level the depressions in the ground surface that cause water accumulation.

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APPENDIX. Bird species detected at Trabzon International Airport and Aviation Safety Ranking Values (IBSC 2002)

Euro code	English name	Scientific name	IUCN	Migration status	Body measurements Lt / WS (cm)	Size classes	Weight (gr)	ASRV	
								St.	F
Divers									
Gaviidae									
20	Red-throated loon	<i>Gavia stellata</i>	LC	W	61 / 106	L	1650	3	4
30	Arctic loon	<i>Gavia arctica</i>	LC	W	66 / 120	L	2200	5	5
Grebes									
Podicipedidae									
70	Little grebe	<i>Tachybaptus ruficollis</i>	LC	R, W	27 / 43	M	170	1	2
90	Great crested grebe	<i>Podiceps cristatus</i>	LC	R, SV	49 / 88	L	730	2	3
120	Black-necked grebe	<i>Podiceps nigricollis</i>	LC	W	31 / 58	M	390	2	3
Cormorants									
Phalacrocoracidae									
720	Great cormorant	<i>Phalacrocorax carbo</i>	LC	R, SV	90 / 145	L	3200	5	5
800	European shag	<i>Gulosus aristotelis</i>	LC	R	75 / 100	L	1800	4	5
820	Pygmy cormorant	<i>Microcarbo pygmaeus</i>	LC	W	48 / 85	L	700	2	3
Herons, Egrets & Bitterns									
Ardeidae									
1190	Little egret	<i>Egretta garzetta</i>	LC	W, PM	60 / 90	L	450	2	3
1210	Great white egret	<i>Ardea alba</i>	LC	W, PM	95 / 155	L	1100	3	4
1220	Grey heron	<i>Ardea cinerea</i>	LC	W, PM	95 / 160	L	1500	3	4
Storks									
Ciconiidae									
1340	White stork	<i>Ciconia ciconia</i>	LC	SV	110 / 205	L	3400	5	5
Ducks, geese & waterfowl									
Anatidae									
1790	Eurasian wigeon	<i>Marca penelope</i>	LC	W	48 / 80	L	720	2	3
1860	Mallard	<i>Anas platyrhynchos</i>	LC	R, W	56 / 90	L	1150	3	4
1890	Northern pintail	<i>Anas acuta</i>	LC	W	56 / 88	L	900	2	3
1960	Red-crested pochard	<i>Nettion rufina</i>	LC	W	55 / 86	L	1150	3	4

Euro code	English name	Scientific name	IUCN	Migration status	Body measurements Lt / WS (cm)	Size classes	Weight (gr)	ASRV	
								St.	F
1980	Common pochard	<i>Aythya ferina</i>	VU	W	45 / 80	L	820	2	3
2030	Tufted duck	<i>Aythya fuligula</i>	LC	W	43 / 70	L	760	2	3
	Hawks	Accipitridae							
2380	Black kite	<i>Milvus migrans</i>	LC	PM	57 / 145	L	730	2	3
2390	Red kite	<i>Milvus milvus</i>	LC	PM	63 / 155	L	850	2	3
2600	Western marsh-harrier	<i>Circus aeruginosus</i>	LC	PM	52 / 120	L	650	2	3
2610	Hen harrier	<i>Circus cyaneus</i>	LC	W, PM	48 / 110	L	430	2	3
2630	Montagu's harrier	<i>Circus pygargus</i>	LC	W, PM	48 / 105	L	320	2	3
2690	Eurasian sparrowhawk	<i>Accipiter nisus</i>	LC	R, PM	33 / 68	M	220	1	2
2870	Eurasian buzzard	<i>Buteo buteo</i>	LC	R, PM	54 / 120	L	900	2	3
2880	Long-legged buzzard	<i>Buteo rufinus</i>	LC	R, PM	57 / 140	L	1150	3	4
2980	Booted eagle	<i>Hieraaetus pennatus</i>	LC	PM	47 / 120	L	800	2	3
	Falcons & caracaras	Falconidae							
3040	Common kestrel	<i>Falco tinnunculus</i>	LC	R, W	35 / 72	M	220	1	2
3070	Red-footed falcon	<i>Falco tvesperinus</i>	VU	PM	30 / 70	M	150	1	2
3100	Eurasian hobby	<i>Falco subbuteo</i>	LC	PM	32 / 77	M	230	1	2
3200	Peregrine falcon	<i>Falco peregrinus</i>	LC	W, PM	44 / 105	L	700	2	3
	Fowls & pheasants	Phasianidae							
3700	Common quail	<i>Coturnix coturnix</i>	LC	PM	17 / 34	S	90	1	2
	Crakes, coots & gallinules	Rallidae							
4290	Common coot	<i>Fulica atra</i>	LC	R, W	37 / 75	M	750	2	3
	Stilts & avocets	Recurvirostridae							
4550	Black-winged stilt	<i>Himantopus himantopus</i>	LC	W, PM	37 / 73	M	160	1	2

Euro code	English name	Scientific name	IUCN	Migration status	Body measurements Lt / WS (cm)	Size classes	Weight (gr)	ASRV	
								St.	F
Stone curlews									
Burhinidae									
4590	Eurasian thick-knee	<i>Burhinus oediniemus</i>	LC	R, SV	42 / 80	L	460	2	3
Coursers & pratincoles									
Glareolidae									
4650	Collared pratincole	<i>Glareola pratincola</i>	LC	SV	26 / 63	M	85	1	2
Plovers & lapwings									
Charadriidae									
4690	Little Ringed plover	<i>Charadrius dubius</i>	LC	SV	15 / 45	S	39	1	1
4770	Kentish plover	<i>Charadrius alexandrinus</i>	LC	R, W	16 / 50	S	42	1	1
4850	Eurasian golden plover	<i>Pluvialis apricaria</i>	LC	W	27 / 71	M	210	1	2
4930	Northern lapwing	<i>Vanellus vanellus</i>	NT	W	30 / 73	M	220	1	2
Sandpipers & allies									
Scolopaciidae									
5170	Ruff	<i>Calidris pugnax</i>	LC	W, PM	28 / 54	M	160	1	2
5290	Eurasian woodcock	<i>Scolopax rusticola</i>	LC	W, PM	34 / 60	M	300	2	3
5320	Black-tailed godwit	<i>Limosa limosa</i>	NT	W, PM	40 / 66	L	290	1	2
5460	Common redshank	<i>Tringa totanus</i>	LC	W, PM	29 / 50	M	130	1	2
5480	Common greenshank	<i>Tringa nebularia</i>	LC	W, PM	32 / 57	L	190	1	2
5530	Green sandpiper	<i>Tringa ochropus</i>	LC	W, PM	22 / 43	S	71	1	2
5560	Common sandpiper	<i>Actitis hypoleucos</i>	LC	W, PM	20 / 34	S	40	1	1
Gulls, terns & skimmers									
Laridae									
5820	Black-headed gull	<i>Larus ridibundus</i>	LC	W	41 / 99	L	280	1	2
5900	Mew gull	<i>Larus canus</i>	LC	W	43 / 104	L	440	2	3
5910	Lesser black-backed gull	<i>Larus fuscus</i>	LC	W	60 / 138	L	770	2	3
5927	Yellow-legged gull	<i>Larus michahellis</i>	LC	R	61 / 139	L	1100	3	4
6110	Sandwich tern	<i>Thalasseus sandvicensis</i>	LC	W	38 / 103	M	220	1	2

Euro code	English name	Scientific name	IUCN	Migration status	Body measurements Lt / WS (cm)	Size classes	Weight (gr)	ASRV	
								St.	F
6150	Common tern	<i>Sterna hirundo</i>	LC	PM	33 / 88	M	120	1	2
Pigeons & doves									
6650	Rock dove	<i>Columba livia</i>	LC	R	33 / 66	M	310	2	3
6680	Stock dove	<i>Columba oenas</i>	LC	W	33 / 66	M	300	2	3
6840	Eurasian collared-dove	<i>Streptopelia decaocto</i>	LC	R	32 / 51	M	150	1	2
6870	European turtle-dove	<i>Streptopelia turtur</i>	VU	SV	27 / 50	M	130	1	2
6900	Laughing dove	<i>Spilopelia senegalensis</i>	LC	R	26 / 43	M	82	1	2
Owls									
7570	Little owl	<i>Athene noctua</i>	LC	R	22 / 53	S	170	1	2
Nighthjars									
7780	Eurasian nighthjar	<i>Caprimulgus europaeus</i>	LC	R, SV	27 / 59	M	79	1	2
Swifts									
7950	Common swift	<i>Apus apus</i>	LC	SV	16 / 45	S	38	1	1
Kingfishers									
8310	Common kingfisher	<i>Alcedo atthis</i>	LC	R	16 / 25	S	31	1	1
Hoopoes									
8460	Common hoopoe	<i>Upupa epops</i>	LC	SV	27 / 44	M	67	1	2
Larks									
9720	Crested lark	<i>Galerida cristata</i>	LC	R	17 / 34	S	43	1	1
Swallows									
9920	Barn swallow	<i>Hirundo rustica</i>	LC	SV	20 / 30	S	19	1	1
10010	Northern house-martin	<i>Delichon urbicum</i>	LC	SV	13 / 28	S	14	1	1

Euro code	English name	Scientific name	IUCN	Migration status	Body measurements Lt / WS (cm)	Size classes	Weight (gr)	ASRV	
								St.	F
Wagtails & pipits									
Motacillidae									
10040	Tawny pipit	<i>Anthus campestris</i>	LC	SV	16 / 26	S	28	1	1
10090	Tree pipit	<i>Anthus trivialis</i>	LC	PM	15 / 26	S	24	1	1
10110	Meadow pipit	<i>Anthus pratensis</i>	LC	W	14 / 24	S	19	1	1
10170	Western yellow wagtail	<i>Motacilla flava</i>	LC	SV	17 / 25	S	18	1	1
10180	Citrine wagtail	<i>Motacilla citreola</i>	LC	SV	17 / 26	S	22	1	1
10200	White wagtail	<i>Motacilla alba</i>	LC	R	18 / 27	S	20	1	1
Wrens									
Troglodytidae									
10660	Northern wren	<i>Troglodytes troglodytes</i>	LC	R, W	10 / 15	S	10	1	1
Flycatchers									
Muscicapidae									
10990	European robin	<i>Erithacus rubecula</i>	LC	SV	13 / 21	S	17	1	1
11040	Common nightingale	<i>Luscinia megarhynchos</i>	LC	SV	16 / 24	S	21	1	1
11060	Bluethroat	<i>Cyanecula svecica</i>	LC	W	14 / 22	S	20	1	1
11210	Black redstart	<i>Phoenicurus ochruros</i>	LC	W	14 / 24	S	16	1	1
11220	Common redstart	<i>Phoenicurus phoenicurus</i>	LC	W	14 / 22	S	15	1	1
11370	Whinchat	<i>Saxicola rubetra</i>	LC	R, SV	12 / 22	S	17	1	1
11390	European stonechat	<i>Saxicola torquatus</i>	LC	SV	13 / 19	S	15	1	1
11440	Isabelline wheatear	<i>Oenanthe isabellina</i>	LC	SV	16 / 29	S	31	1	1
11460	Northern wheatear	<i>Oenanthe oenanthe</i>	LC	SV	16 / 29	S	30	1	1
13350	Spotted flycatcher	<i>Muscicapa striata</i>	LC	SV	14 / 24	S	17	1	1
13470	Semi-collared flycatcher	<i>Ficedula semitorquata</i>	LC	SV	13 / 23	S	14	1	1

Euro code	English name	Scientific name	IUCN	Migration status	Body measurements Lt / WS (cm)	Size classes	Weight (gr)	ASRV	
								St.	F
	Thrushes	Turdidae							
11870	Eurasian blackbird	<i>Turdus merula</i>	LC	R	24 / 36	S	100	1	2
	Reed warblers & allies	Acrocephalidae							
12550	Olivaceous warbler	<i>Iduna pallida</i>	LC	SV	13 / 20	S	11	1	1
	Leaf warblers	Phylloscopidae							
13110	Common chiffchaff	<i>Phylloscopus collybita</i>	LC	R, W	10 / 18	S	9	1	1
	Kinglets	Regulidae							
13140	Goldcrest	<i>Regulus regulus</i>	LC	W	9 / 14	S	6	1	1
	Long-tailed tits	Aegithalidae							
14370	Long-tailed tit	<i>Aegithalos caudatus</i>	LC	W	14 / 18	S	9	1	1
	Tits, chickadees & titmice	Paridae							
14610	Coal tit	<i>Parus ater</i>	LC	W	12 / 19	S	9	1	1
14620	Eurasian blue tit	<i>Cyanistes caeruleus</i>	LC	R, W	12 / 18	S	11	1	1
14640	Great tit	<i>Parus major</i>	LC	R	14 / 24	S	18	1	1
	Shrikes	Laniidae							
15150	Red-backed shrike	<i>Lanius collurio</i>	LC	SV	17 / 26	S	30	1	1
15190	Lesser Grey shrike	<i>Lanius minor</i>	LC	SV	20 / 28	S	45	1	1
15200	Great Grey shrike	<i>Lanius excubitor</i>	LC	SV	24 / 30	S	60	1	1
	Crows & jays	Corvidae							
15390	Eurasian jay	<i>Garrulus glandarius</i>	LC	R	34 / 55	M	170	1	2
15630	Rook	<i>Corvus frugilegus</i>	LC	R	45 / 90	L	430	2	3
15670	Carrion crow	<i>Corvus corone</i>	LC	R	46 / 98	L	510	2	3
15720	Common raven	<i>Corvus corax</i>	LC	R	62 / 132	L	1300	3	4

Euro code	English name	Scientific name	IUCN	Migration status	Body measurements Lt / WS (cm)	Size classes	Weight (gr)	ASRV	
								St.	F
Starlings									
15820	Common starling	<i>Sturnus vulgaris</i>	LC	SV	21 / 38	S	78	1	2
Sparrows									
15910	House sparrow	<i>Passer domesticus</i>	LC	R	14 / 24	S	34	1	1
Finches									
16360	Common chaffinch	<i>Fringilla coelebs</i>	LC	R	14 / 26	S	24	1	1
16490	European greenfinch	<i>Chloris chloris</i>	LC	SV	15 / 26	S	28	1	1
16530	European goldfinch	<i>Carduelis carduelis</i>	LC	SV	12 / 23	S	16	1	1
16660	Red crossbill	<i>Loxia curvirostra</i>	LC	W	20 / 28	S	47	1	1
17170	Hawfinch	<i>Coccothraustes coccothraustes</i>	LC	W	18 / 31	S	58	1	1
Buntings									
18570	Yellowhammer	<i>Emberiza citrinella</i>	LC	W	16 / 26	S	28	1	1
18660	Ortolan bunting	<i>Emberiza hortulana</i>	LC	SV	16 / 26	S	22	1	1
18820	Corn bunting	<i>Emberiza calandra</i>	LC	R, W	18 / 29	S	47	1	1

Abbreviations: IUCN = Global threat status, EN = endangered, VU = vulnerable, NT = near threatened, LC = least concern, DD = data deficient, NE = not evaluated. Migration status: R = resident, SV = summer visitor, PM = passage migrant, W = wintering. Body measures: Lt = length, WS = wingspan, S = small, M = medium, L = large, St = solitary, F = flocking. ASRV categories: 1 = without significant relevance for air traffic safety, 2 = low potential danger, 3 = intermediate potential danger, 4 = high potential danger, 5 = very high potential danger

