

A FOURTY-YEAR (1968-2009) AVIAN SURVEY AT GENOA AIRPORT

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ABSTRACT

Five annual avian censuses (1968-69, 1972-73, 1982-83, 2001-02, 2008-09) were conducted in the period between 1968 and 2009, since the Cristoforo Colombo Genoa Airport was functional. Despite the different purposes of the individual studies, researchers applied a common approach of visual and vocal identification. Qualified personnel weekly surveyed accessible areas of the airport. This paper summarizes the findings of the five researches. A checklist of the 137 species observed includes phenology, quantitative changes, and their trend over the entire period. Relative abundance of dominant and sub-dominant species was computed within each survey. The generalist/opportunist species have gradually asserted themselves throughout the years with regard to ecological needs.

KEY WORDS

Cristoforo Colombo airport, avian survey, checklist, relative abundance, phenology.

INTRODUCTION

There have been several studies, in the past, concerning the co-occurrence of birds and aircrafts in airports. Moreover, surveys are conducted worldwide to enhance the knowledge relative to both qualitative and quantitative avian local communities (Spanò & Toschi, 1969; Montemaggiori, 2001; Van Belle et al., 2007; Devault et al., 2009; Baldaccini et al., 2012).

Here we compare and analyze data collected at Cristoforo Colombo Airport in Genoa (Italy) in two more recent ornithological surveys (2001/2002, Rossi unpub. and 2008/2009, Galli unpub.) with

three earlier studies (1968/69, 1972/73, and 1982/83). The Airport Management committed the two more recent studies to the University of Genoa (Dip. Te. Ris), in accordance to the circular ENAC APT 01 – 30.05.2007. On the other hand, the three earlier studies were just finalized to enhance the knowledge of the dynamics related to the presence of birds at the airport.

This airport infrastructure, overlooking the built-up–area of Sestri Ponente, was obtained filling up a portion of sea (1955 cfr. Consorzio Autonomo del Porto di Genova - 1972). Since the beginning of its fulfilment, it represented an attraction for migrating birds, which in Liguria follow the costal line, and even penetrate across the main valleys of the Appennino. It was clear that this area (about 150 ha limited by mountains and sea) represented a perfect rest site for birds in transit, making possible also the sighting of uncommon species which use it when other options are not available.

Even since the structure was operating (1962), the East-West oriented meadows among the paved areas were still pleasing, also because of the low human disturbance. In the following years, beside intrinsic factors linked to single species abundances, further modifications of the site might have altered the avian pattern. Several structures contribute to characterize the avian community in this airport. One of them is the Foranea Dam located about 230 m from the airport and protecting it. In addition, the wide exposed gravel bed of the Polcevera creek (1 km eastern), the immense Scarpino landfill (6 km northern), and other several urban and harbour structures, also contribute to build up this community.

METHODS

In all five studies, data were collected weekly by qualified scientists, which also considered the annual biological cycles, properly monitoring them. The survey methods used in the five studies are coherent with those described below. However, different operating

procedures were in effect within the airport in the five surveys. In addition, different researchers were involved in the investigation. For these reasons, quantitative estimations must be considered as orders of magnitude.

The methods used were based on visual and vocal identification along transects covering the perimeter roads, taxiways, landing and takeoff fields, usually forbidden. Surveys were often performed through the use of vehicles of the surveillance personnel, proceeding at low speed and with several stops to facilitate both identification of species and count of sightings. The individuals spotted were recorded on proper field data sheets, specifying species, gender, age (if possible), quantity, flight direction (when clear) and location. For the latest parameter, the airport area was divided in sub-areas based on either structural or environmental pattern.

Early morning was the preferred survey time, but occasional surveys were performed also in different times during the day. Moreover, information collected by the safety personnel, regularly patrolling the field, was used to integrate the information gathered by the scientific personnel. This allowed the reconstruction of a more complete frame of the attendance of the area by some species and their daily attendance.

Observations were performed by qualified researchers surveying the area and using 10x50 binoculars and a camera. All records were entered and stored in a database prepared *ad hoc* and later processed, analyzed, and compared with the results of the previous studies in the same area (Spanò & Toschi, 1969; Spanò, 1974; Fior, unpub.). This work allowed an estimation of both qualitative and quantitative evolution of the avian species in the study area. We would like to clarify that when we talk about number of individuals we refer to cumulative counts accounting also for same individuals observed in different times. This led to an obvious overestimation.

RESULTS AND DISCUSSION

In contrast to a total of 239 bird species surveyed in the whole urban area of Genoa in the period 1996-1999 (Borgo *et al.*, 2005), 130 species were identified in the airport site during the four earlier studies: 88 species were counted in the period 1968-69 (Spanò & Toschi, 1969), 66 in the 1972-73 research (Spanò, 1974), 87 during 1981-82 (Fior, ined.), and 76 in the study of 2001-02.

Still in the airport area, 77 species of birds were counted during the more recent research (2008-09). Among them, 9 species breeding, 18 wintering, 32 only transiting and/or summer visitors, while 14 species seem to be sedentary. In addition, 6 new species (Short-eared Owl (*Asio flammeus*), Eider (*Somateria mollissima*), Great White Egret (*Ardea alba*), Eurasian Dotterel (*Charadrius morinellus*), Bar-tailed Godwit (*Limosa lapponica*) and Common magpie (*Pica pica*) were identified in this last studies compared to the former researches (table 1). The total census in the airport area, for the 5 years, accounted for 137 species.

In the near area of the Container Port in Voltri, several researchers monitoring the site identified as many as 197 species during the period 1984-1993 (Borgo *et al.*, 1995). The large number of observations is likely linked to the shifts of ecological conditions during the developing works representing a variety of attractions for various species of birds. Their phenology was specified for the research period, as well as their eventual inclusion in Annex I of Directive 79/409/EEC on Conservation of Wild Birds.

Nomenclature and systematics follow Brichetti & Massa (1998).

Table 1. *Check-list* of the species identified in the area of Genoa airport and their eventual inclusion in Annex I of Directive 79/409/EEC on Conservation of Wild Birds; as for the phenology of the several species, we adopted the following terminology: M = migrating, W = wintering, B = breeding, S = sedentary, E = summer visitor: present during the reproductive period, but not breeding, O = occasional, par = partial, irr = irregular.

Species	All. I	Phenology				
		1968-1969	1972-1973	1982-1983	2001-2002	2008-2009
<i>Circus aeruginosus</i> (Linnaeus, 1758)	X	M	M	M	M	M
<i>Circus cyaneus</i> (Linnaeus, 1766)	X	M	M? ¹	-	M	M
<i>Circus pygargus</i> (Linnaeus, 1758)	X	M		-	M	-
<i>Buteo buteo</i> (Linnaeus, 1758)	-	-	-	M	-	-
<i>Falco peregrinus</i> Tunstall, 1771	X	-	-	-	W	S
<i>Falco tinnunculus</i> Linnaeus, 1758	-	M E	E	M W	S	S
<i>Coturnix coturnix</i> (Linnaeus, 1758)	-	M Wpar	M	M	M	-
<i>Phasianus colchicus</i> Linnaeus, 1758	-	-	O	O	-	-
<i>Gallinula chloropus</i> (Linnaeus, 1758)	-	-	-	-	M	-
<i>Grus grus</i> (Linnaeus, 1758)	X	-	-	M	-	-
<i>Haematopus ostralegus</i> Linnaeus, 1758	-	M	-	-	M	M
<i>Himantopus himantopus</i> (Linnaeus, 1758)	X	M	M	M	M	M
<i>Burhinus oedicephalus</i> (Linnaeus, 1758)	X	M	-	-	M	-
<i>Glareola pratensis</i> (Linnaeus, 1766)	X	M	M	M	M	M
<i>Charadrius alexandrinus</i> Linnaeus, 1758	-	M	M	-	-	-

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Circus sp.

Species	All. I	Phenology				
		1968-1969	1972-1973	1982-1983	2001-2002	2008-2009
<i>Charadrius dubius</i> Scopoli, 1786	-	M	M	M	M	-
<i>Charadrius hiaticula</i> Linnaeus, 1758	-	M	M	M	M	M
<i>Charadrius morinellus</i> (Linnaeus, 1758)	X	-	-	-	-	M irr
<i>Pluvialis apricaria</i> (Linnaeus, 1758)	X	O	M	-	M	M
<i>Pluvialis squatarola</i> (Linnaeus, 1758)	-	M	M	M	M	M
<i>Vanellus vanellus</i> (Linnaeus, 1758)	-	M W	M W	M	M W	M W
<i>Calidris alba</i> (Pallas, 1764)	-	O	-	-	-	-
<i>Calidris alpina</i> (Linnaeus, 1758)	-	M	M	M Wpar	-	M
<i>Calidris canutus</i> (Linnaeus, 1758)	-	-	M	-	M	-
<i>Calidris ferruginea</i> (Pontoppidan, 1763)	-	-	-	M	-	-
<i>Calidris minuta</i> (Leisler, 1812)	-	-	-	M	M	M
<i>Calidris temminckii</i> (Leisler, 1812)	-	O	-	-	-	-
<i>Philomachus pugnax</i> (Linnaeus, 1758)	-	M	M	M	M	-
<i>Lymnocyptes minimus</i> (Brunnich, 1764)	-	O	-	-	-	-
<i>Gallinago gallinago</i> (Linnaeus, 1758)	-	M Wpar	M	M Wpar	M	-
<i>Gallinago media</i> (Latham, 1787)	X	-	-	M	-	-
<i>Limosa limosa</i> (Linnaeus, 1758)	-	M	M ²	M	-	-
<i>Limosa lapponica</i> Linnaeus, 1758	X					M

Species	All. I	Phenology				
		1968-1969	1972-1973	1982-1983	2001-2002	2008-2009
<i>Numenius arquata</i> (Linnaeus, 1758)	X	-	-	M Wpar	-	M
<i>Numenius phaeopus</i> (Linnaeus, 1758)	-	M	M	M Wpar	M	M
<i>Tringa erythropus</i> (Pallas, 1764)	-	-	-	M	-	-
<i>Tringa glareola</i> (Linnaeus, 1758)	X	-	-	M	M	M
<i>Tringa nebularia</i> (Gunnerus, 1767)		-	-	M	M	M
<i>Tringa ochropus</i> Linnaeus, 1758	-	M	-	-	-	-
<i>Tringa totanus</i> (Linnaeus, 1758)	-	M	M	M	M	M
<i>Xenus cinereus</i> (Güldenstädt, 1774)	X	-	M	-	-	-
<i>Actitis hypoleucos</i> (Linnaeus, 1758)	-	M	M	M	M	M
<i>Larus michahellis</i> Naumann, 1840 (= <i>Larus cachinnans</i> Pallas, 1811)	-	M W Epar	S	M W	S	S
<i>Larus canus</i> Linnaeus, 1758	-	M Wpar	M Wpar	M W	-	-
<i>Larus fuscus</i> Linnaeus, 1758	-	M W	M W	M W	M W	M W
<i>Larus melanocephalus</i> Temminck, 1820	X	M W	M W	M Wpar	M W	M W
<i>Larus minutus</i> Pallas, 1776	-	M	M	-	-	-
<i>Larus ridibundus</i> Linnaeus, 1766	-	M W	M W	M W	M W	M W
<i>Gelochelidon nilotica</i> (Gmelin, 1789)	X	M	M	-	-	-
<i>Sterna albifrons</i> Pallas, 1764	X	-	-	M Wpar	-	-
<i>Sterna caspia</i> Pallas, 1770	X	O	-	-	-	-
<i>Sterna hirundo</i> Linnaeus, 1758	X	M	-	M Wpar	-	M Wpar
<i>Sterna sandvicensis</i> Latham, 1787	X	-	-	M Wpar	-	M W

Species	All. I	Phenology				
		1968-1969	1972-1973	1982-1983	2001-2002	2008-2009
<i>Chlidonias hybridus</i> (Pallas, 1811)	X	M	-	-	-	M
<i>Chlidonias leucopterus</i> (Temminck, 1815)	-	M	-	M	-	-
<i>Chlidonias niger</i> (Linnaeus, 1758)	X	M	M	-	-	-
<i>Columba livia</i> Gmelin, 1789 (forma <i>domestica</i>)	-	-	-	-	S	S
<i>Columba palumbus</i> (Linnaeus, 1758)	-	-	-	-	M	-
<i>Streptopelia turtur</i> (Linnaeus, 1758)	-	M	-	-	-	-
<i>Caprimulgus europaeus</i> Linnaeus, 1758	X	M	-	-	M	M
<i>Asio flammeus</i> (Pontoppidan, 1763),	X	-	-	-	-	M
<i>Apus apus</i> (Linnaeus, 1758)	-	M E	M Epar	M	M E	M E
<i>Alcedo atthis</i> (Linnaeus, 1758)	X	-	-	-	W	-
<i>Coracias garrulus</i> Linnaeus, 1758	X	-	-	M	-	-
<i>Upupa epops</i> Linnaeus, 1758	-	M	M	-	M	M
<i>Melanocorypha calandra</i> (Linnaeus, 1766)	X	-	-	O	-	-
<i>Calandrella brachydactyla</i> (Leisler, 1814)	X	M B	M B	M	M B	M B
<i>Galerida cristata</i> (Linnaeus, 1758)	-	-	-	-	M	M

Species	All. I	Phenology				
		1968-1969	1972-1973	1982-1983	2001-2002	2008-2009
<i>Lullula arborea</i> (Linnaeus, 1758)	X	-	-	M	M	-
<i>Alauda arvensis</i> Linnaeus, 1758	-	M W	M W	S B	S B	S B
<i>Riparia riparia</i> (Linnaeus, 1758)	-	M	M	M	M	M
<i>Hirundo rustica</i> Linnaeus, 1758	-	M E	M	M	M E	M E
<i>Delichon urbica</i> (Linnaeus, 1758)	-	M	M	M	M E	-
<i>Anthus campestris</i> (Linnaeus, 1758)	X	M	M	M Wpar	M	M B
<i>Anthus cervinus</i> (Pallas, 1811)	-	M	-	-	M	-
<i>Anthus pratensis</i> (Linnaeus, 1758)	-	M W	M W	M W	M W	M W
<i>Anthus spinoletta</i> (Linnaeus, 1758)	-	-	-	Wpar	M	M
<i>Anthus trivialis</i> (Linnaeus, 1758)	-	-	-	Wpar	-	M
<i>Motacilla alba</i> Linnaeus, 1758	-	W	M	M W	S	S
<i>Motacilla cinerea</i> Tunstall, 1771	-	-	M	M W	S	S
<i>Motacilla flava</i> Linnaeus, 1758	-	M	M	M	M	M
<i>Erithacus rubecula</i> (Linnaeus, 1758)	-	-	-	-	M W	-
<i>Luscinia megarhynchos</i> Brehm, 1831	-	-	-	M		-
<i>Phoenicurus ochruros</i> (Gmelin, 1774)	-	-	-	M W	M W	M W
<i>Phoenicurus phoenicurus</i> (Linnaeus, 1758)	-	M	M	M	-	M
<i>Saxicola rubetra</i> (Linnaeus, 1758)	-	M	M	M	M	M
<i>Saxicola torquata</i> (Linnaeus, 1766)	-	M W	M	M W	M W	M W
<i>Oenanthe hispanica</i> (Linnaeus, 1758)	-	-	-	M	-	-
<i>Oenanthe oenanthe</i> (Linnaeus, 1758)	-	M	M	M	M	M
<i>Turdus iliacus</i> Linnaeus, 1766	-	M	-	-	-	-
<i>Turdus merula</i> Linnaeus, 1758	-	M	-	-	-	S
<i>Turdus pilaris</i> Linnaeus, 1758	-	M	-	-	-	-
<i>Turdus philomelos</i> Brehm, 1831	-	Wpar	-	M	-	-

Species	All. I	Phenology				
		1968-1969	1972-1973	1982-1983	2001-2002	2008-2009
<i>Cisticola juncidis</i> (Rafinesque, 1810)	-	S B	S B	S B	S B	M S B
<i>Sylvia atricapilla</i> (Linnaeus, 1758)	-	-	-	M Wpar	-	-
<i>Sylvia communis</i> Latham, 1787	-	-	-	M	-	-
<i>Phylloscopus collybita</i> (Vieillot, 1817)	-	M W	M W	M W	M W	-
<i>Muscicapa striata</i> (Pallas, 1764)	-	-	-	M	-	-
<i>Ficedula hypoleuca</i> (Pallas, 1764)	-	M	M	-	-	-
<i>Lanius collurio</i> Linnaeus, 1758	X	M	-	M	M	-
<i>Lanius senator</i> Linnaeus, 1758	-	M	-	-	M	-
<i>Pica Pica</i> Linnaeus, 1758	-					B
<i>Corvus corone cornix</i> Linnaeus, 1758	-	-	-	Wpar	S	S
<i>Corvus monedula</i> Linnaeus, 1758	-	-	-	W	-	W
<i>Sturnus vulgaris</i> Linnaeus, 1758	-	M W	M W	M Wpar	S	S
<i>Passer italiae</i> Vieillot, 1817	-	S	S B	M W	S B	S B
<i>Passer montanus</i> (Linnaeus, 1758)	-	M W Epar	M W	M Wpar	-	-
<i>Fringilla coelebs</i> Linnaeus, 1758	-	M W	M W	M W	M W	-
<i>Serinus citrinella</i> (Pallas, 1764)	-	-	-	Wpar	-	-
<i>Carduelis cannabina</i> (Linnaeus, 1758)	-	M W	-	-	M	M W
<i>Carduelis carduelis</i> (Linnaeus, 1758)	-	M W	W	S B	S B	S B
<i>Carduelis chloris</i> (Linnaeus, 1758)	-	-	-	Wpar	M	-
<i>Carpodacus erythrinus</i> (Pallas, 1770)	-	O	-	-	-	-
<i>Plecrophenax nivalis</i> (Linnaeus, 1758)	-	M W	M W	-	-	-
<i>Emberiza cirius</i> Linnaeus, 1766	-	W	M W	-	-	-
<i>Emberiza melanocephala</i> Scopoli, 1769	-	-	-	O	-	-
<i>Emberiza schoeniclus</i> (Linnaeus, 1758)	-	M W	M Wpar	-	M W	M W
<i>Miliaria calandra</i> (Linnaeus, 1758)	-	W	S	M Wpar	S B	S B

Before the period 2002-2003, the number of Grey Herons (*Ardea cinerea*) and Cormorants (*Phalacrocorax carbo*) was low, and they were usually spotted only during migratory periods. In the last decades, instead, they have been expanding in Liguria. The Grey Heron is currently present all year round (with peaks in June, and an averaged set of ten) and the Cormorant from autumn until late spring (peaks in February, and an averaged set of ten). Furthermore, the Cattle Egret (*Bubulcus ibis*) (two counts) was first sighted during the IV research, and later again during the V study (4 counts) together with 3 individuals of Great white Egret. This last species represents an important record since it is not frequent in Liguria (GALLI & SPANÒ, 2004; BORGIO *et al.*, 2005).

On the other hand, we noticed a decreasing number of Little Egrets (*Egretta garzetta*) between the I and the 2001–2002 research (103 in survey I, 18 in survey II, 26 in survey III, and 8 in surveys IV and V)

In the II and III studies, ducks such as the Mallard (*Anas platyrhynchos*) seemed to be able to nest on the ground of the airport. In fact, during the 2001-2002 study, a nest was discovered in a residual of grove of reeds, in the area called Testata 11 (W), but not during the 2008 study because this habitat was no more available. In the last two studies ducks sightings were exclusively of Mallard, Garganey (*Anas querquedula*) and Eider. The latter species had been seen only in the last study (V), and we can infer the presence of a wintering population of 10-15 individuals in the close sea portion of Pegli and Sestri Ponente. Still regarding the Eider, it is considered rare and irregularly present in Italy but constantly seen in the harbour areas in Genoa from Voltri through the Bisagno river's outlet (summer months excluded) (Borgio *et al.*, 2005). During the former researches, four more species of ducks were identified (Teal (*Anas crecca*), Pintail (*Anas acuta*), Shoveler (*Anas clypeata*), Red-breasted Merganser (*Mergus serrator*), transiting

mostly, but also taking advantage of temporary rainfall ponds, most of them recently eliminated.

The number of raptors over the grassy areas had been increasing up to the 2001-2002 study. Marsh Harriers (*Circus aeruginosus*) and Kestrels (*Falco tinnunculus*) (always individual sightings) were often hovering in the sky even for long times, probably hunting for small wild rodents. The last research confirmed the presence of the two species and their phenology (spring migrants the Marsh Harriers, sedentary the Kestrels). In the last survey, a couple of Kestrels was constantly present and probably breeding in the airport.

In some rare occasions, an individual of Peregrine (*Falco peregrinus*) has also been spotted in the airport: single observations on April 1st 2001 and on July 4th 2008 to confirm its phenology as stantial-breeding in the urban area of Genoa (Galli & Spanò, 2004; Borgo *et al.*, 2005).

Lapwing (*Vanellus vanellus*) is a migratory species and partially wintering too. The results from the II research (55 Lapwings counted in autumn–winter period) were very similar to the IV one (peaks in February, with tens of individuals) but contradicting the results of research I (461 lapwings from October to March, on the lawn between the two runways). During the 2008-2009 survey 104 lapwings were counted in the airport mostly between November and February, while only spotted in April. Daily maximums were relative to the month of January (25-27 individuals/day). In February, observations of lapwings at the end of their wintering period usually overlap with the new arrivals of the pre-breeding migration phase. These results reveal a more important trend in comparison to 2001-2002 research (33 counts), but still with lower amounts if compared to the earlier studies. High frequencies of lapwings in the area could be due to adverse weather conditions during winter time, leading them to stop along while migrating.

Only some species of Waders were regularly counted during all five researches: Black-winged Stilt (*Himantopus himantopus*), Ruff (*Philomachus pugnax*), Whimbrel (*Numenius phaeopus*), Common Sandpiper (*Actitis hypoleucos*), and Lapwing. Other species had been seen with minor regular occurrence.

In the last survey, a couple of species not seen before in this area of study were identified. Bar-tailed Godwit (2 individuals on April 28th 2009 close to the southwestern edge of Testata 11) which is a rare species in the area of Genoa, and the most recent record regarding it is relative to September 1996 in the Voltri Harbour (6 counts) (Borgo *et al.*, 2005). The second species of importance here in this context is the Eurasian Dotterel (1 count along the SE perimetral road on October 2nd 2008) (C. Galuppo, personal comment) irregular migrant in Liguria and not included in the “Atlante Ornitologico di Genova”. These birds are particularly fond of coastal and/or humid open spaces, and they are mostly observed during the spring migratory period. In fact, the airport area represents one of the very few suitable sites, along the radically urbanized Riviera, in which stopping and getting some rest. This is proved by the fact that these birds are usually observed during or right after abundant rainfalls.

In particular, ponds of water on the ground, following heavy precipitations, are attractive for these birds, mostly because of the insects that remain trapped and drown in and because of the worms popping out from the soil. Despite several remedies implied to mitigate their formation, ponds still represent an easy way of feeding. The whole airport represents a suitable area for birds for the most different reasons. Birds can take fresh water baths in the ponds, filled with rainfall. On the other hand they dry off or stay warm on the drained cement, thanks to the different heat capacities of the asphalt, on extremely cold days, especially. These conditions are suitable for gulls too. Moreover, the wide-open spaces provide the advantage to detect, ahead of time, any incoming threat.

The number of Yellow-legged gulls (*Larus michahellis*) is ten-fold today and revealed to be the most numerous species in all year long (peaks of thousands in June and September and lows in March-May). Its increasing trend was evident yet during the 1968-69 and the 1972-73 researches. This situation has affected the ratio of the Black-headed Gull (*Larus ridibundus*) to the Yellow-legged Gull, which was higher during the 1968-69 survey, lower during the 1972-73 one, and it was even lower during the IV and the V researches. However, their peak period in winter and their absence in June were consistent, due to the fact that the Yellow-legged Gull is more likely to nest both in urban and in more suitable coastal areas.

However, on a daily basis the Yellow-legged Gull and the Black-headed Gull are regularly present from a few hundred individuals to a peak of several thousand. This data was even confirmed by a specific research (March, 2005-February, 2006) regarding Gulls at Genoa airport (Sedda, unpub.). The presence of these birds is likely due to the ever-increasing suitable sites for gulls. These sites include the Urban Solid Rubbish (RSU) Scarpino damp, the wide and sheltered rest sites like the Voltri Terminal Europe (V.T.E.), and flat and high sites, near to the sea and undisturbed like the roofs of Fiera del Mare Pavilion. Another suitable area for Yellow-legged gulls is represented by the roofs of the buildings of the no longer operative ILVA steel factory in Genova-Cornigliano. This area has been evaluated during the V research, and it seems that the drastic reduction of anthropogenic disturbance following the abandon status may explain this preference. Gulls use the airport areas also for resting (when unfavourable weather and sea conditions make impossible to stop elsewhere) and to check for any predators. This is valid also for both the Yellow-legged Gull and the Black-headed Gull, although the last one is only wintering.

In addition to the above Gull's species, others have been detected in relatively small numbers during all five researches. Most of them are migrating or partially wintering: the Common Gull (*Larus*

canus), the Little Gull (*Larus minutus*) and the Lesser black-backed Gull (*Larus fuscus*). On the other hand, the Mediterranean Gull (*Larus melanocephalus*) and the Lesser black-backed Gull in the third research (1982-83), are relatively abundant. The Mediterranean Gull attends the airport for feeding purposes, mostly. In the past, its densities were discontinuous (Borgo *et al*, 2005), but today its population is more abundant.

In the latest survey, the Mediterranean gull is present from December through May and shows peaks of presence in the period January through March, with a few tens per day (maximum 63 counts on Jan 29th, 2009). In the same period, only one individual of Lesser Black-backed Gull had been identified on flight over the sea tract between the airport and the close by dam (Aug 29th, 2008). On the other hand, at least a couple of tens individuals were recorded, during the earlier researches (35 counts in the I, 56 in the II, 477 in the III and 18 in the IV).

The Feral Pigeon (*Columba livia domestica*) reveals to be uniformly increasing, since it adapts very easily to new areas, and regularly visits the grassy patches of the airport, mainly for feeding purposes. It is a sedentary species mainly, with individuals coming from the city, and it has been regularly observed, starting from the IV research, from April through November. During the V research, two abundance peaks had been recorded: one in winter (December through January), and a late one during spring-summer with counts of 40-60 individuals each time. The reason for the first peak is not clearly defined, but the second peak is likely linked to the mowing activity that makes seeds available on the ground in the airport patches, in particular following the post-reproductive period, increasing in urban colonies.

The dead body of a male of Short-eared Owl (*Asio flammeus*) had been found aside the SE perimetral road on July 4th 2009. No external evident traumas were identified and, even after analysis by personnel of the Museum of Natural History of Genoa, the cause of

death was not established. No records related to this species are available in the previous surveys in the airport area. The Short-eared Owl is a double passage species in Liguria and in the Atlas of Borgo et al. (2005) we can find only one record in the autumn 1999 in the center of the city, and a random presence in the Voltri Harbour. The Starling (*Sturnus vulgaris*) has always been present with very high numbers in the airport area. Spanò et al. (2001) stated that the winter urban population of starlings in Genoa was about 10-15.000 individuals. Their recent tendency to nest even along the coastline has increased their period of presence. In the first research (1969), 1500 starlings were counted in groups of 100-200, but in the II and III researches this count was not confirmed. In the IV research (2001-2002), 29.000 starlings were counted from August to January, with peaks in November of 5-10.000 counts. These amounts were consistent with the counts during the last survey (2008-2009) and with censuses in Liguria and in the city of Genoa during recent decades (Spanò et.al., 2001; Borgo et al., 2005).

The Grey Hooded Crow (*Corvus corone cornix*) was observed during the IV and V surveys every month through the year, with 7 to 18 counts per day. This was very different from the past, and this could be due to some Passerine Birds nesting among the dense high grass aside the runways, and offspring representing an easy prey to those crows.

In the V research, an individual of Magpie (*Pica pica*) had been reported (July 6th, 2008). The fact that this species had not been observed before could likely be related to its recent colonization of the urban environment in Genoa (Borgo *et al.*, 2005)

There are very few other Passerine Birds species which need, for their life cycle, open fields such as the ones at the Genoa airport. Other species occupy this area for a limited time (during migratory periods) or for specific and temporary need (e.g. feeding purposes).

During the first four researches, species like the Eurasian tree Sparrow (*Passer montanus*), the Italian Sparrow (*Passer italiae*), the Skylark (*Alauda arvensis*), the Goldfinch (*Carduelis carduelis*), and the

Fan-tailed Warbler (*Cisticola juncidis*) were regularly present in the airport. In the V survey there is evidence of a severe reduction of the above mentioned four species. In particular, for the Fan-tailed Warbler there were two counts referred to the same day (April 29th 2009) during the spring migratory period. This is inconsistent with the previous researches in which the species was present all year long, sedentary and nesting. During the 2001-2002 research, Fan-tailed Warblers were preferring areas with high density of bushes. The more regular maintenance of low grass might have caused the severe decreasing of individuals attending the area.

During the IV and the V researches, even the counts relative to the Short-toed Lark (*Calandrella brachydactyla*) revealed to be lower, while the Tree Sparrow (*Passer montanus*) was never sighted (always present during the previous three surveys). In addition, there was a constant reduced number of the Meadow Pipit (*Anthus pratensis*) (except in '82-'83), but also of the Swallow (*Hirundo rustica*), the Yellow Wagtail (*Motacilla flava*), the Tawny Pipit (*Anthus campestris*) and the Northern Wheatear (*Oenanthe oenanthe*).

In general, the presence of other Passerine Birds like the Stonechat (*Saxicola rubicola*), the Corn Bunting (*Emberiza calandra*) and the Song Thrush (*Turdus philomelos*), had been extremely irregular during all the surveys.

Graphs in figures 1, 2, 3, 4, and 5, show the relative abundance of the dominant (relative abundance $\geq 5\%$) and sub-dominant (relative abundance between 2% and 5%) avian species in the airport area during the five researches.

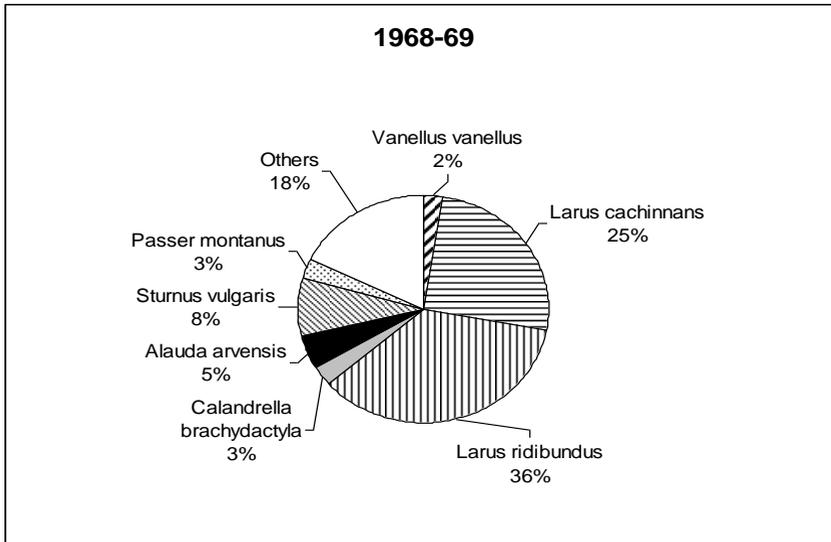


Figure 1. Relative abundance of dominant and sub-dominant species in the study 1968/69.

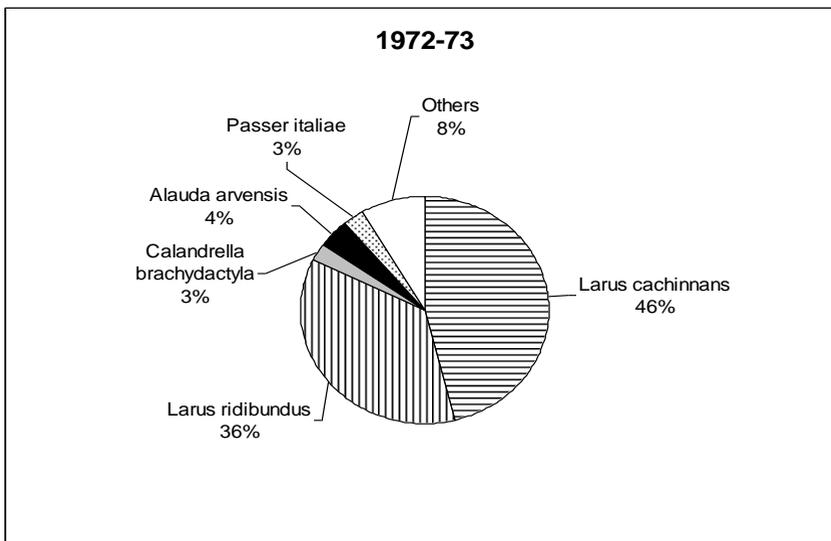


Figure 2. Relative abundance of dominant and sub-dominant species in the study 1972/1973.

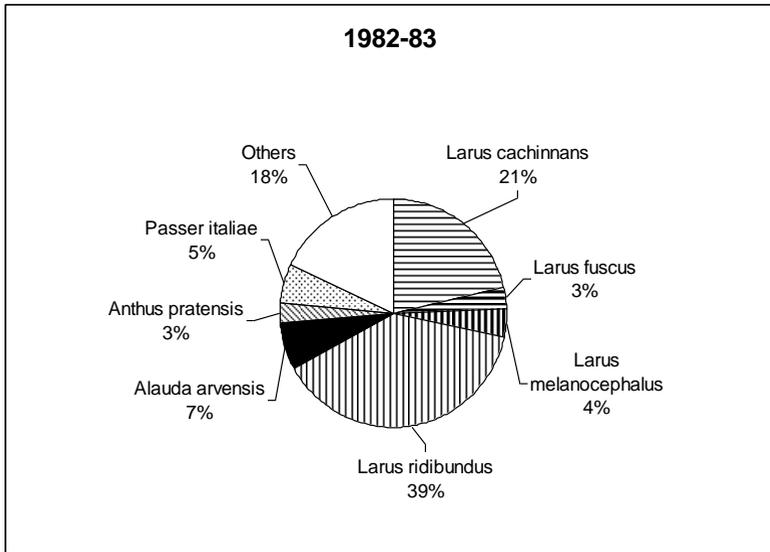


Figure 3. Relative abundance of dominant and sub-dominant species in the study 1982/1983.

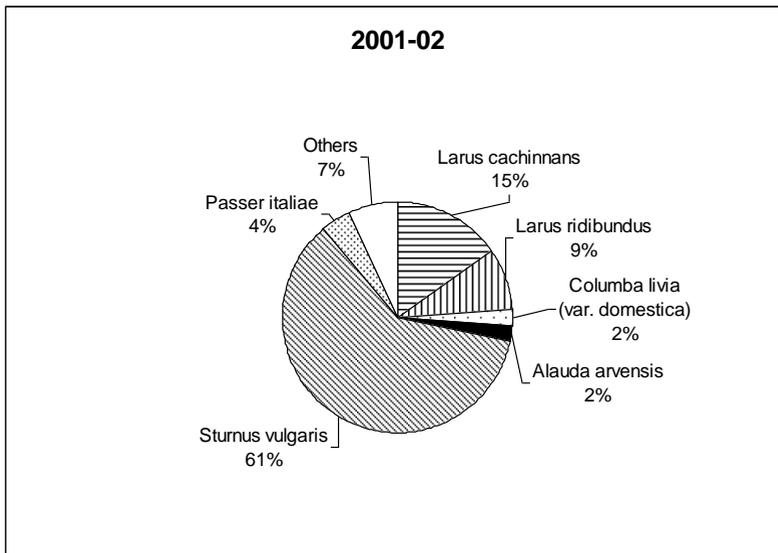


Figure 4. Relative abundance of dominant and sub-dominant species in the study 2001/2002.

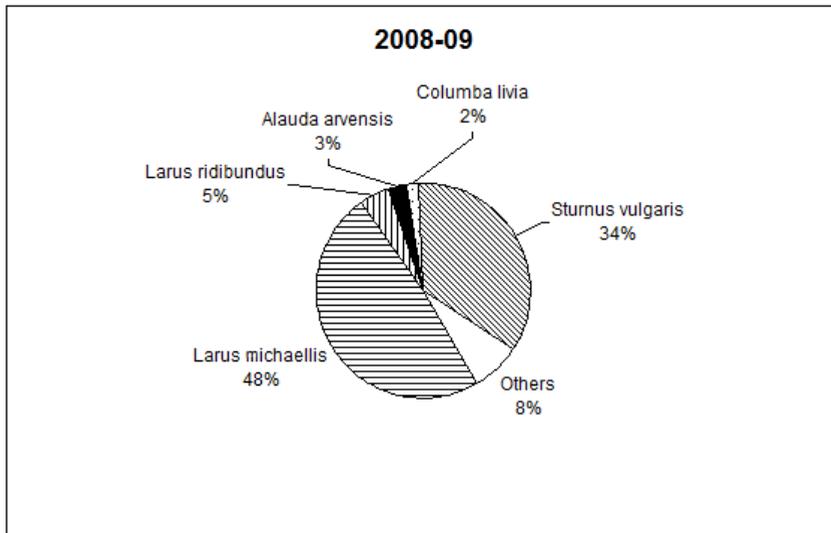


Figure 5. Relative abundance of dominant and sub-dominant species in the study 2008/2009.

CONCLUSIONS

Quantitative differences in the avian community have been detected over the four decades of the 5 surveys. Excluding occasionally spotted species, some of the remaining ones revealed changes in both absolute and relative abundances. The airport has been subject to important changes in the past decades, mainly due to structural and management improvements. Some of these changes were made just to reduce attractiveness for birds (e.g. elimination of small ponds and bushes, and a regular lawn mowing).

These changes appear to have negatively affected the presence mostly, but even the residence time of the most ecologically demanding bird species. This is mostly evident in a decreasing count over the time of generalist species, among dominant and sub-dominant species. In each of the first three investigations, at least three species among Lapwings, Short-toed Larks, Skylarks, Meadow Pipits, Eurasian Tree Sparrow and Italian Sparrow, showed such abundances. On the other

hand, in the last two surveys, the opportunistic species (Gulls) or generalist or synanthropic (Starlings and Feral Pigeons) appear as exclusive dominant species. Finally, among the sub-dominant species of 2008-2009, only the Skylark was present.

REFERENCES

- Andreotti A., Borgo A., Borgo E., Fior T., Spanò S. & Truffi G. 1986. Seasonal fluctuations of Gulls in Liguria. Berlin: Springer, NATO ASI Ser. V.G. 12, "Mediterranean marine avifauna": 477-489.
- Baldaccini N. E., Carpita F., Sensale L. & Antinori M. 2012. Aeroporto di Malpensa "Nuovo Masterplan Aeroportuale" Procedura di V.I.A. Integrazioni Volontarie – Approfondimenti Ambientali Allegato 4 – Ricerca Naturalistica Ambientale. SEA Aeroporti Milano, Università di Pisa.
- Borgo E., Burlando B., Cornara L., Maranini N., Spanò S. & Truffi G. 1995. Variazioni dell'avifauna nel costruendo porto di Genova Voltri (1984-1993). In Fraissinet, M., Coppola, D., Del Gaizo, S., Grotta, M. & Mastronardi, D. L'avifauna degli ecosistemi d'origine antropica: zone umide artificiali, coltivati, aree urbane: 104-107. Napoli: Monografia 5, ASOIM, Electa.
- Borgo E., Burlando B., Cornara L. & Spanò S. 1994. Wasteland Bird use. Evidence from the N-W Mediterranean coast (Genoa, Italy). *Avocetta* 18: 151-156.
- Borgo E., Galli L., Galuppo C., Maranini N. & Spanò S. (Cur.) 2005. Atlante ornitologico della città di Genova. *Boll. Mus. Ist. biol. Univ. Genova* 69-70: 1-317.
- Bottino S., Spanò S., Borgo E. & Albonetti P. 1998. La popolazione urbana di piccione domestico (*Columba livia* forma domestica) a Genova: dati preliminari. In Bologna M.A. et al. (Eds.) *Atti I Convegno nazionale sulla fauna urbana: 185-188*. Roma: Palombi.
- Brichetti P. & Massa B., 1998. Check list degli Uccelli italiani aggiornata a tutto il 1997. *Riv. ital. Orn.*, 68 (2): 129-152.
- CAA (Civil Aviation Authority) 1990. *Bird Control on Aerodrome*. London, UK: CAP 384.
- Carpino F., Fulgione D., Ripa D., Guglielmi S., Valore M., Piano L., Guglielmi R., Caliendo M.F., de Filippo G. & Milon, M. 2003. Le comunità di uccelli dell'ambiente aeroportuale di Napoli. *Avocetta* 27: 63.
- Carrabba P., Grotta M. & Fraissinet M. 1995. L'avifauna dell'aeroporto di Capodichino "U. Niutta" (Napoli). *Gli Uccelli d'Italia* 20: 21-32.

- Consorzio Autonomo del Porto di Genova, 1972. Genova, 1962-1972, i dieci anni dell'aeroporto. Sagep ed., Genova.
- Devault T., Kubel J., Rhodes O Jr. & Dolbeer R. 2009. "Habitat and Bird Communities at Small Airports in the Midwestern USA". Wildlife Damage Management Conferences -- Proceedings. Paper 115.
- Facoetti R., Gagliardi A., Milesi S. & Tosi G. 2003. Stima della probabilità di bird-strike nell'aeroporto di Orio al Serio (BG). *Avocetta* 27: 65.
- Fior T. & Borgo E. 1986. Gabbiano reale *Larus cachinnans*. In: Aa. VV. Atlante degli Uccelli nidificanti in Liguria: 62. Genova: Regione Liguria.
- Galli L. ined.. Studio dell'avifauna dell'Aeroporto "C. Colombo di Genova" in relazione alla problematica del Bird-Strike. relazione tecnica, Dip.Te.Ris. Univ. Genova
- Galli L. & Spanò S. 2004. Uccelli e Mammiferi di Liguria. Grafiche Amadeo, Imperia.
- Guglielmi S., Valore M., Caliendo M.F., Carpino F., de Filippo G., Fulgione D., Ripa D., Guglielmi R., Piano L. & Milone M. 2003. L'avifauna e le attività aeroportuali: un'analisi in differenti contesti ambientali. *Avocetta* 27: 69.
- Modica F. ined.. Il problema del Bird strike e i sistemi di controllo dei volatili nei siti aeroportuali. Univ. Palermo Tesi di Laurea in Ing. Aeronautica. A.A. 1998-1999.
- Montemaggiori A. 1997. Il monitoraggio dei volatili in aeroporto: l'esempio di Fiumicino Venezia: III Seminario Bird strike Committee Italy.
- Montemaggiori A. 2001. Airport 2001: uccelli in pista!. *Avocetta*, 25: 125.
- Piano L., Guglielmi R., Guglielmi S., Valore M., Caliendo M.F., Carpino F., de Filippo G., Fulgione D., Ripa D. & Milone M. 2003. Impatto tra uccelli ed aeromobili all'Aeroporto di Capodichino-Napoli. *Avocetta* 27: 72.
- Rossi A. ined.. Occupazione ornitica dell'aeroporto di Genova in un ciclo annuale ed eventuale impatto sul traffico aereo. Univ. Genova. Tesi di Laurea in Sc. Biologiche. A.A. 2002-2003.
- Sedda C. ined.. I Laridi in un ciclo annuale (2005-2006) all'aeroporto di Genova nel quadro di potenziali impatti con aeromobili. Univ. Genova. Tesi di Laurea in Sc. Naturali. A.A. 2004-2005.
- Spanò S. 1974. Il contributo alla conoscenza dei ritmi di occupazione ornitica dell'Aeroporto di Genova. *Riv. ital. Orn.* 44 (2): 81-114.
- Spanò S. & Toschi A. 1969. Ritmi di occupazione ornitica dell'Aeroporto di Genova in un ciclo annuale. *Riv. ital. Orn.* 29 (2): 305-383.
- Spanò S. & Truffi G. 1996. Revisione critica della Checklist delle specie della fauna italiana. Vertebrata. Aves. *Boll. Mus. Ist. biol. Univ. Genova* 60-61: 201-218.

- Spanò S., Truffi G. & Galli L. 2001. Status dello Storno *Sturnus vulgaris* svernante in Liguria e impatto sulle attività antropiche. Genova: Regione Liguria.
- Van Belle J., Shamoun-Baranes J., Van Loon E. & Bouten W., 2007. An operational model predicting autumn bird migration intensities for flight safety. *Journal of Applied Ecology* 44: 864–874.