

Short Communication

Synanthropic common birds in a Mediterranean urban park: no significant local change along a medium-term time range (2006-2023)

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Abstract - In this note, we report multi-year trends in abundance over a medium-term period (2006-2023) for 8 species belonging to a guild of common synanthropic breeding birds breeding in an urban park in central Tyrrhenian Italy. Despite fluctuations in mean values, none of the species showed any local significant change during the survey period. Excluding possible sampling biases, the absence of significant oscillations in mean abundances can be traced back to the specific context of the study area: the complex landscape mosaics and traditional agricultural management typical of the Tuscia Laziale, adjacent to a Medieval historical town with a low rate of urbanization. These factors can allow the maintenance of constant abundances over medium to long periods, even for two species in numerical decline at a national/regional scale (*Passer italiae*, *Carduelis carduelis*). Further analyses of these medium-term trends in other urban parks are necessary to compare whether these patterns at the local scale match the trends at the national scale.

Key words: abundance, historical town, local vs national scale, *Passer italiae*, *Carduelis carduelis*.

Riassunto - Uccelli comuni sinantropici in un parco urbano mediterraneo: nessuna variazione significativa a scala locale nel medio termine (2006-2023).

In questa nota, riportiamo le tendenze pluriennali di abbondanza di una gilda di 8 specie comuni di uccelli sinantropici nidificanti in un parco urbano nell'Italia centrale tirrenica su un arco temporale relativamente esteso sul medio termine (2006-2023). Sebbene le specie evidenzino fluttuazioni nei valori medi, esse non hanno mostrato alcun cambiamento significativo durante il periodo di indagine (primavera 2006-2023). Escludendo possibili distorsioni di campionamento, che abbiamo cercato di controllare, l'assenza di oscillazioni significative nelle abbondanze medie può essere ricondotta al contesto specifico dell'area di studio, caratterizzato da complessi mosaici ambientali e da una gestione agricola tradizionale tipica della Tuscia Laziale, il tutto adiacente a una città storica medievale con un basso tasso di urbanizzazione. Ciò può consentire il mantenimento di abbondanze costanti su periodi

medio-lunghi, anche per alcune specie in declino numerico a scala nazionale/regionale (*Passer italiae*, *Carduelis carduelis*). Sono necessarie ulteriori analisi di queste tendenze a medio termine in altri parchi urbani per confrontare se questi modelli su scala locale corrispondono alle tendenze su scala nazionale.

Parole chiave: abbondanza, città storica, scala locale vs. nazionale, *Passer italiae*, *Carduelis carduelis*.

In recent decades, many species of passerine birds have shown demographic oscillations because of environmental changes at both continental and local scales, so much so that they have been selected as indicators for many decades (Järvinen & Väisänen, 1979; Taper *et al.*, 1995). In the Mediterranean area, there is evidence of population declines affecting species linked to agroecosystems (Fonderflick *et al.*, 2010; Castro-Caro *et al.*, 2015; Traba & Morales, 2019) while species linked to disturbed and anthropized ecosystems (e.g., synanthropic) show stable or increasing trends (Campedelli *et al.*, 2012 for Italy).

In particular, as regards the bird assemblages inhabiting urban parks, in the last decades, there has been an increase in synanthropic species. However, if at the Northern European level there is evidence of such long-term trends (Felgentreff *et al.*, 2024), for the Mediterranean area, there is a lack of long-term studies on individual urban parks where synanthropic species trends have been analyzed (Murgui, 2014; Battisti & Dodaro, 2016).

In this note, we report multi-year trends in abundance and diversity of a guild of 8 species of common synanthropic birds in an urban park in central Tyrrhenian Italy. The analysis of these trends can provide information on environmental changes at the local scale that affect species that are still relatively widespread and common at the national scale (Lardelli *et al.*, 2022).

The study area coincides with private olive groves and gardens ('Giardini di Valverde') located in the western peripheral part of the historical town of Tarquinia (province of Viterbo, Lazio, central Italy). The urban green area extends over about 3 hectares (coordinates: 42°15'12.7"N 11°45'12.0"E; Fig. 1). The vast surrounding area is dominated by agricultural activities, with a medium-high naturalness, secondary roads, watercourses, canals, and watersheds (tree rows and small woodland patches). The tree vegetation includes relict patches with a prevalence

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of Turkey oak *Quercus cerris* and downy oak *Quercus pubescens*, with nuclei of alien and anthropogenically introduced species (*Robinia pseudoacacia*, *Ailanthus altissima*, *Cupressus sempervirens*). Along slopes, embankments, hummocks and hedges between farms, in conditions of lack of human disturbance and with greater xerophily, shrubby vegetation develops (bush areas with a prevalence of *Pyrus amygdaliformis*, *Crataegus monogyna*, *Prunus spinosa*, *Paliurus spina-christi*, *Cornus sanguinea*, *Lonicera etrusca*, *Rosa canina*, *Euonymus europaeus*, *Spartium junceum*, *Pistacia lentiscus*, *Phillyrea angustifolia*, *Rubus ulmifolius*, *R. caesius*; vegetation class: Rhamno catharticae-Prunetea spinosae Rivas Goday & Borja ex Tüxen 1962). Herbaceous crops are represented by therophytic vegetation, with ruderal nitrophilous and semi-nitrophilous species (classes: Stellarietea mediae Tüxen, Lohmeyer & Preising ex Von Rochow 1951 and Artemisietea vulgaris Lohmeyer, Preising & Tüxen ex Von Rochow 1951). Moreover, there are uncultivated lands, periodically mown, and olive trees *Olea europaea*. The area falls within the Mediterranean phytoclimatic region (lower mesomediterranean thermotype or thermohilly-lower humid ombrotype; Xerotheric region, mesomediterranean subregion; Blasi, 1993).

We focused our study on 8 synanthropic common bird species (mainly urban adapters or exploiters: Benmazouz *et al.*, 2021; Ciebiera *et al.*, 2021; Abou Zeid *et al.*, 2023) linked to urban environments with a medium-high degree of human disturbance (Battisti & Fanelli, 2015; Komlyk *et al.*, 2024) and widely distributed at the national scale (Lardelli *et al.*, 2022), especially in mosaics of suburban natural environments and parks (Battisti *et al.*, 2022).

From 2006 to 2023, each year we carried out a sampling along 6 line transects, each one 50 m in length (lateral belt: 25 m) during the breeding season (spring). Each transect was surveyed three times on different days be-

tween March and May, recording the number of individuals of any species. To overcome possible underestimations (Battisti *et al.*, 2014), we selected the highest number of birds recorded in any transect. Afterwards, we obtained the mean number (and standard deviation) of individuals (considered as a proxy of true abundance) for the 6 transects in any breeding season.

To compare the median values of abundance among years, we performed a Kruskal-Wallis test (Dytham, 2011). We used the PAST 4.01 software (Hammer *et al.*, 2001). The α -level was set at 0.05.

In total, during the 2006-2023 period, we recorded 7545 individuals belonging to 8 synanthropic species (Fig. 2): *Passer italiae* (n=1349), *Streptopelia decaocto* (n=777), *Turdus merula* (n=141), *Parus major* (n=266), *Carduelis carduelis* (n=315), *Sturnus vulgaris* (n=1479), *Corvus monedula* (n=2845), *Pica pica* (n=373; Fig. 2; Tab. S1). We observed occasional large roosts of *Sturnus vulgaris* in 2012 and 2013 (not considered in the analyses; see Tab. S1). All the selected species, although showing fluctuations in mean values, did not show any significant local change during the survey period in this suburban park; for all the species, there are no significant differences between sample medians in abundance ($H=2.078$, $p>0.05$; Kruskal-Wallis test for equal medians; Tabs. S2 and S3; Fig. 3).

At the national scale, all the selected species show a favorable conservation status (Gustin *et al.*, 2016), with the exception of *Passer italiae* and *Carduelis carduelis* which have shown a numerical decrease in recent years, both at the national scale (Gustin *et al.*, 2016) and in some geographical sectors also at the regional scale (Tirozzi *et al.*, 2021), including Lazio (Brunelli *et al.*, 2011). In particular, in recent decades, a general decline of *Passer domesticus* has been detected throughout the European range (Hole *et al.*, 2002; Mahesh & Lanka, 2021), which has also affected

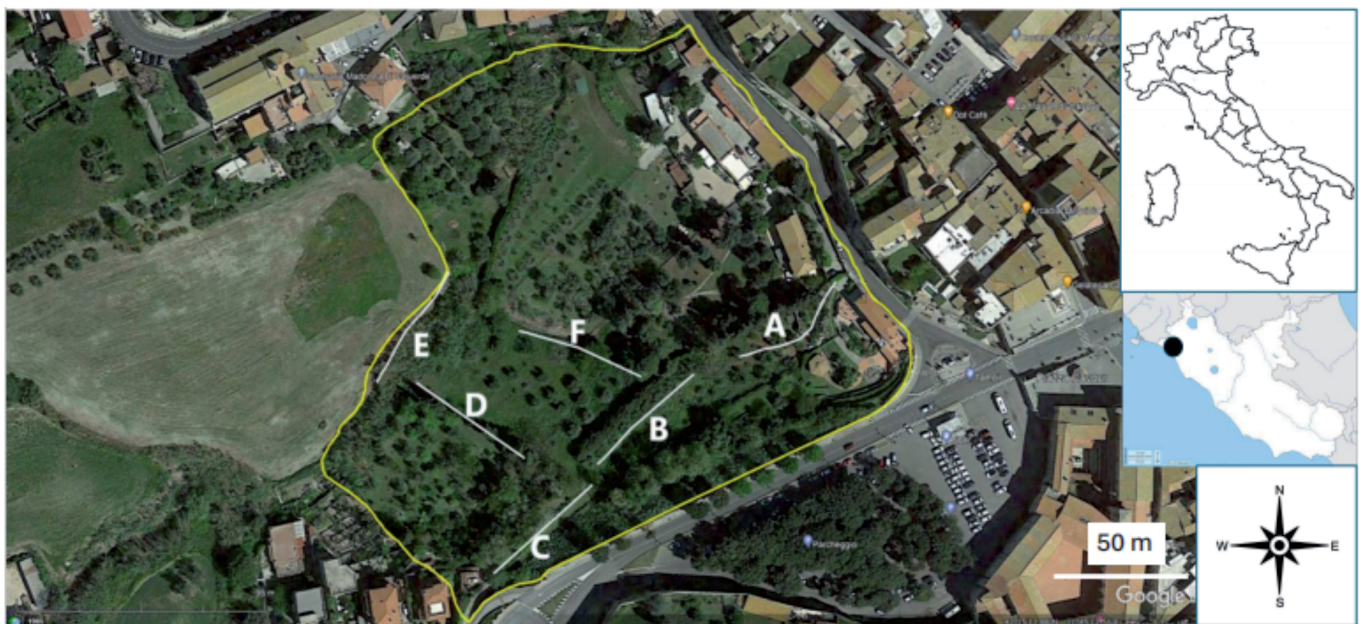


Fig. 1 – Map of the study area (Giardini di Valverde, Tarquinia; Lazio, central Italy). Line transects (A-F) have been reported./ Mappa dell'area di studio (Giardini di Valverde, Tarquinia; Lazio, Italia centrale). Sono stati riportati i transetti lineari (A-F).

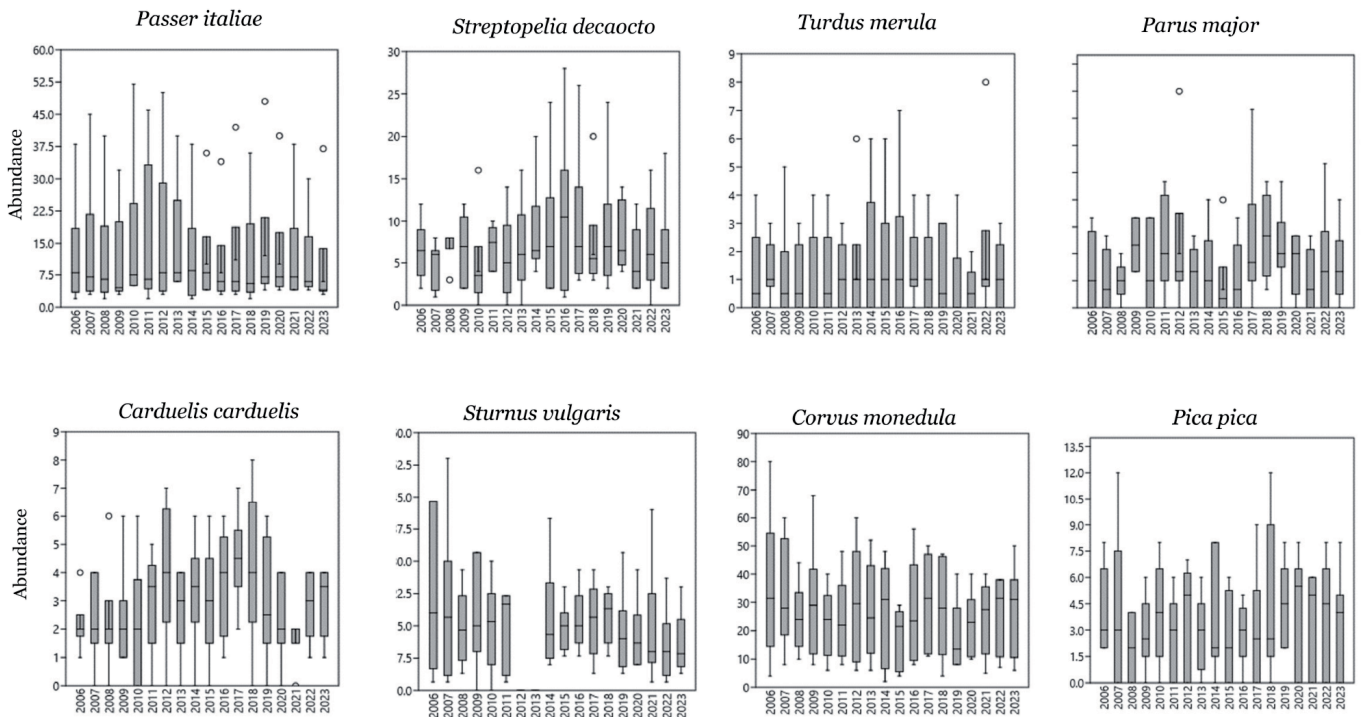


Fig. 2 – Box plots of averaged abundance (y-axis) along the 2006-2023 time range. The minimal and maximal values are shown with short horizontal lines (“whiskers”); 25-75 percentiles are drawn using a box; horizontal line shows the median values. Outliers have been reported (circles). Data for *Sturnus vulgaris*’ roosts in 2012 and 2013 have been excluded from analyses. / Box plot dell’abbondanza media (asse y) lungo l’intervallo temporale 2006-2023. I valori minimi e massimi sono mostrati con linee orizzontali corte (“baffi”); i percentili 25-75 sono disegnati usando un box; la linea orizzontale mostra i valori mediani. Sono stati segnalati valori anomali (cerchi). I dati per i dormitori di *Sturnus vulgaris* nel 2012 e 2013 sono stati esclusi dalle analisi.

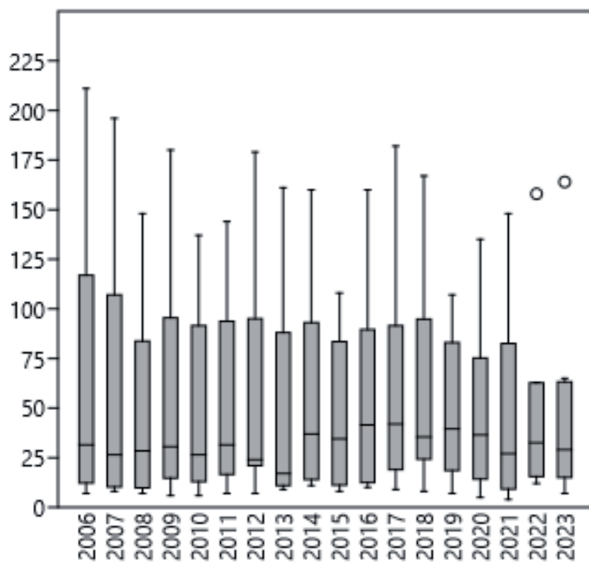


Fig. 3 – Box plots of total averaged abundance (y-axis) along the 2006-2023 time range. The minimal and maximal values are shown with short horizontal lines (“whiskers”); 25-75 percentiles are drawn using a box; horizontal line shows the median values. Outliers have been reported (circles). Data for *Sturnus vulgaris*’ roosts in 2012 and 2013 have been excluded from analyses. / Box plot dell’abbondanza media totale (asse y) lungo l’intervallo temporale 2006-2023. I valori minimi e massimi sono mostrati con brevi linee orizzontali (“baffi”); i percentili 25-75 sono riportati in box; la linea orizzontale mostra i valori mediani. Sono stati segnalati valori anomali (cerchi). I dati per i dormitori di *Sturnus vulgaris* nel 2012 e 2013 sono stati esclusi dalle analisi.

the Italian endemism (*Passer italiae*; see, for systematic: Töpfer, 2006): this numerical decrease has been reported by several authors (Brichetti *et al.*, 2008; Dinetti, 2008; Tirozzi *et al.*, 2021; species in ‘bad’ state of conservation: Peronace *et al.*, 2012; Gustin *et al.*, 2016; BirdLife, 2021; Rete Rurale Nazionale & LIPU, 2024). Long-term decreasing trends have also been observed for some Italian historical towns (Antinori & Mitri, 2023), including central Italy (Fratricelli, 2008, 2009). *Carduelis carduelis* also shows an overall ‘inadequate’ conservation status (Gustin *et al.*, 2016).

Trends in urban and suburban bird species may be influenced by trends at a national scale (Skjelvik & Dale, 2024): in this regard, we would have expected a decline at a local scale of *Passer italiae* and *Carduelis carduelis* also in our study area, which, however, did not emerge from the data in this time range. Analogously, we did not observe a moderate increase in *Pica pica*, as reported at the national scale in Rete Rurale Nazionale & LIPU (2024). However, many species show a mismatch among different scales: for example, in Latium, *Passer italiae*, declining at the national scale, has been indicated with stable populations in Latium; *Sturnus vulgaris*, in moderate decline at the national level, shows a moderate increase in our region (Rete Rurale Nazionale & LIPU, 2024).

Excluding possible sampling biases that we tried to control (using the same researchers, replicating field effort with a long-term representativeness; see Battisti *et al.*,

2014), the absence of significant oscillations in mean abundances can be traced back to the specific context of the study area, characterized by complex landscape mosaics and traditional agricultural management typical of the Tuscia Laziale (Olmi & Zapparoli, 1992), adjacent to a Medieval historical town with a low rate of urbanization: these environmental factors can allow the maintenance of constant abundances over medium to long periods, even for two species in numerical decline at a national/regional scale (*Passer italiae*, *Carduelis carduelis*), particularly sensitive to anthropogenic factors (changes in cultivation practices, mosaic simplification, use of pesticides and herbicides, etc.; Summers-Smith, 2003a, 2003b; Robinson *et al.*, 2005).

This mismatch between national and local trends (i.e., species declining at a large scale but constant in abundance at a local scale) has also been highlighted for other urban and suburban areas (Fraissinet *et al.*, 2023). Although locally based, our data support the hypothesis that urban and suburban parks embedded in low hemerobiotic landscapes (i.e., mosaics with high naturalness and low levels of anthropic disturbance at the level of vegetation mosaics; Battisti & Fanelli, 2015) can maintain declining species at a larger scale in the medium to long-term. In this regard, it would be useful to collect data from studies for other urban and suburban parks along medium to long term, located in cities of different sizes, to verify whether different trends exist for different geographical contexts.

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Supporting Information / Informazioni supplementari

Tab. S1 – Number of records for the selected common synanthropic species and mean abundance (mean ab, and standard deviation) along the time range (2006-2023).

Tab. S2 – Total mean abundance (mean ab; and standard deviation).

Tab. S3 – Comparisons of mean abundance of the common synanthropic species along the 2016-2023 time range. H-value for Kruskal-Wallis test and p-value have been reported. There is no significant difference between sample medians both for single species and for the total.