

## The Atlas of breeding birds of Latium (PAUNIL 2006-2008)

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**Abstract** – Ten years after the first regional atlas, the Ornithological Societies of Latium, with the collaboration of the Regional Parks Agency, decided to update the inventory and distribution of breeding species in the Region. The new atlas project, called PAUNIL, pursues the following aims: to update the inventory and regional distribution of breeding birds; to create distribution maps of abundance for common species; to identify the regional hotspots of species richness; to analyse some relationships between species and habitats according to the Corine Land Cover classes. The project follows the European standard proposed by European Ornithological Atlas Committee for the collection of qualitative data on atlas and the Italian Breeding Bird Monitoring Program called MITO2000 for the collection of quantitative data. The current Atlas project plans to take into account data collected from 2000 to 2008, making use of records already collected during the MITO2000 program since its beginning, as well as records specifically collected during surveys performed in 2006-2008. As of 2006 the data archive of PAUNIL contained 37,348 records pertaining to 171 breeding species, 77 non-Passerines and 94 Passerines. The 10 most common species are: *Sylvia atricapilla*, *Turdus merula*, *Corvus corone*, *Passer italiae*, *Fringilla coelebs*, *Parus major*, *Carduelis carduelis*, *Luscinia megarhynchos*, *Serinus serinus*, and *Hirundo rustica*. As of 2006, the average number of species is 47.3 per Recording UTM Unit (10 x 10 km).

### INTRODUCTION

Italy has a robust tradition of atlas work at the regional level (Gibbons *et al.* 2007) and after the first qualitative atlases realized around the end of the 80's, many others were produced at regional and sub-regional level adopting a quantitative approach. Ten years after the first atlas of breeding bird for the Latium Region (Central Italy) was completed (Progetto Atlante Lazio, PAL; Boano *et al.* 1995), the local Ornithological Societies (SROPU, GPRO, GAROL, GOC, Parus ), with the collaboration of the *Regional Parks Agency* (ARP) decided to undertake a new atlas project.

The project follows the European standard proposed by EOAC (*European Ornithological Atlas Committee*) for the collection of qualitative data on atlas (see Hagemeyer and Blair 1997), and by the Italian Breeding Bird Monitoring Program (*Italian Ornithological Monitoring*, MI-

TO2000) for the collection of quantitative data (Fornasari *et al.* 2002, 2004).

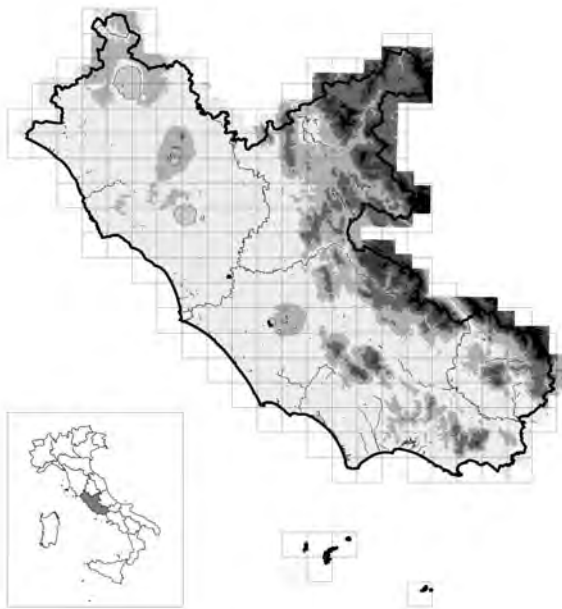
PAUNIL, acronym of "Progetto Atlante degli Uccelli Nidificanti nel Lazio" (*Atlas Project of Breeding Birds of Latium*), pursues the following aims:

- to update the inventory and the knowledge on regional distribution of breeding birds;
- to create distribution maps of abundance for common species;
- to identify the regional hotspots of species richness;
- to analyse some relationships between species and habitats based on the Corine Land Cover classification.

### METHODS

#### *Study area*

The Atlas will cover the entire Latium region. Covering



**Figure 1.** The Latium Region with the main orographic and hydrographic features.

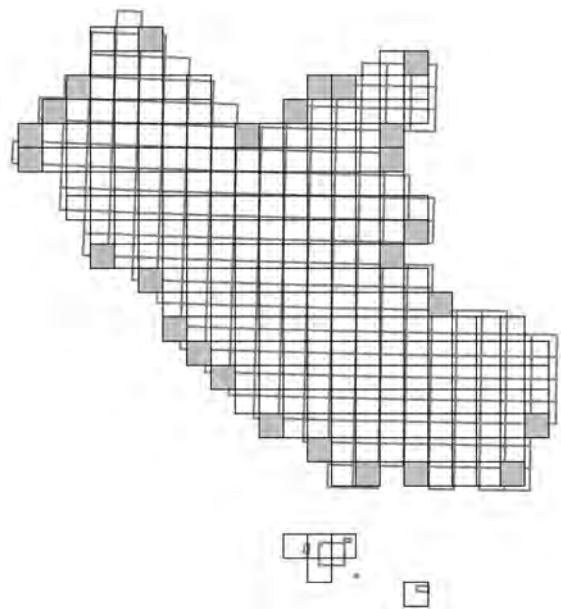
approximately 17,206 km<sup>2</sup>, and located along the Tyrrhenian coast of Central Italy (Fig. 1), Latium is further subdivided into 5 provinces. The region territory is characterised by coastal plains in the western part, with some large lakes of volcanic origin in the northern and central parts, surrounded by predominantly hilly landscape; in the Eastern part of the region a long mountain chain runs in NO-SE direction (Apennines); some lower mountain groups are also present in the centre-southern part of region (Anti-Apennines).

#### **Atlas Organisation**

A scientific and technical committee was set up in 2006 to plan the activities, to coordinate the data collection on a provincial basis and to prepare the annual programs and reports.

The project is expected to cover the period from 2000 to 2008, utilizing the records collected during the MITO2000 program since the beginning, and records specifically collected during surveys performed in 2006-2008. We plan to publish a volume with the main results and elaborations at the beginning of 2009.

The recording units (RUs) are represented by 10x10 km grid squares based on the UTM coordinate system (zone 33N, datum ED50). The former regional atlas (PAL) used the IGMI (Istituto Geografico Militare Italiano) recording units wide about 96 km<sup>2</sup>. The choice of this new projection system will allow to better link the new atlas to



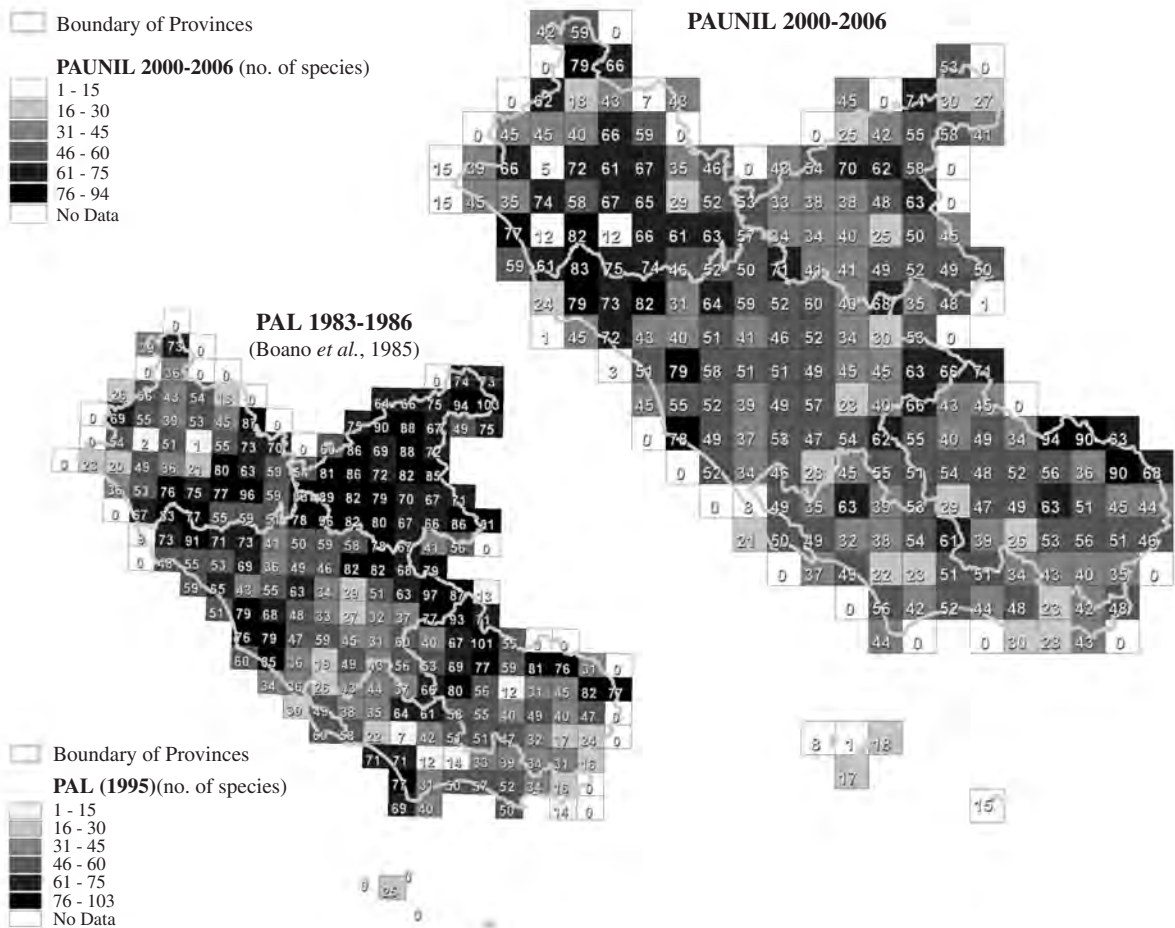
**Figure 2.** The 234 UTM recording units (RU, in grey) grid squares 10x10 km overlapped with the recording units (in black) of former regional atlas (PAL). PAL utilized the IGMI grid squares wide about 96 km<sup>2</sup>. In grey the RU contained less of 10% of regional surface.

other national and european projects, since the UTM system represents the more widely adopted standard. Latium is covered by 234 RUs, but we decided to collect data on only 207 RU, excluding those with more than 90% of the area in other regions or in the sea (Fig. 2).

The sampling protocol foresees at least two diurnal sampling sessions in each RU and one at dusk and nighttime for detecting some species of Rallidae, as well as the Caprimulgidae and Strigiformes. A *database* in MDB format has been created to store data on bird species, localities, breeding categories and environmental parameters such as altitude and land use (Corine Land cover, IV level). The data base can be used in connection with GIS software for the purpose of allowing spatial queries and geoprocessing elaborations.

#### **Quantitative data**

Quantitative data on species were collected by means of 10-minutes point counts during the MITO2000 monitoring program (breeding seasons 2000-2006). Birds heard and seen were recorded in two belts, inside and outside a 100 m radius circle. Stratified surveys were based on the 10x10 km UTM grid; at least 15 point counts were required in each UTM unit (for methods see Fornasari *et al.* 2002). This project was focused on common species, defined as those recorded in at least 10% of the samples. Within the



**Figure 3.** Number of species in recording units (RU), updated to 2006. On the left the number of species registered in the former atlas of Latium (Boano *et al.*, 1995).

PAUNIL project these data will be used to create abundance interpolation maps of common species through the geostatistics procedures of regression kriging (Hengl *et al.* 2003): first, for each species abundance data will be smoothed between adjacent sampling points; then, to take into account habitat preferences, estimated data will be corrected by overlapping a map of the residuals, obtained after a multiple regression analysis on the environmental data (Corine Land Cover classes, III level).

**Qualitative data collection**

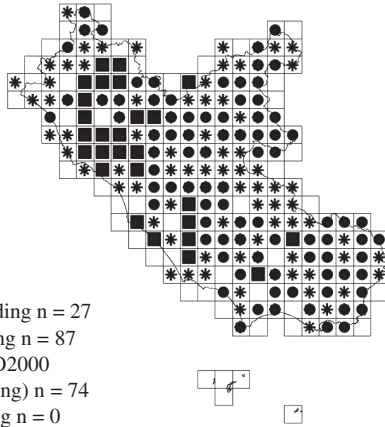
The PAUNIL program is to sample 90 of the 207 RUs in 2006 and 90 in 2007, and to annually check and verify the data collected. During the third year (2008) we will complete the remaining 27 RUs, and possibly explore some specific habitats/areas to look for “probably unregistered” species (rare species and species with low detectability). Each bird recorded is classified as possible breeding,

probable breeding and confirmed breeding, as follows:

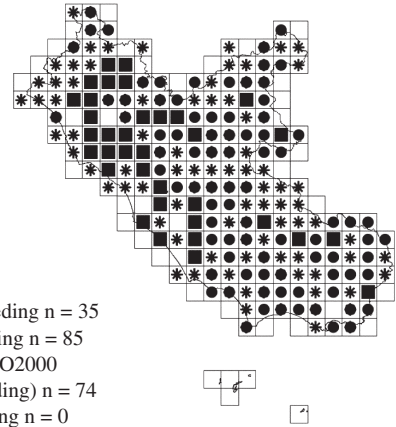
- possible breeding: species observed in breeding season and in possible nesting habitat;
- probable breeding: species observed displaying territorial behaviour (calling males or display), courtship or breeding display;
- confirmed breeding: currently used nest or eggshells found, nest containing eggs or young; recently fledged young; adults carrying faecal sac or food for young; adults carrying material for building nest.

Records of birds observed during quantitative samplings will also be considered in the qualitative data set, since the observers took note of the different type of observation as above (e.g.: calling male, recently fledged young etc) in order to classify the records as possible, probable or confirmed breeding (see Fornasari *et al.* 2002).

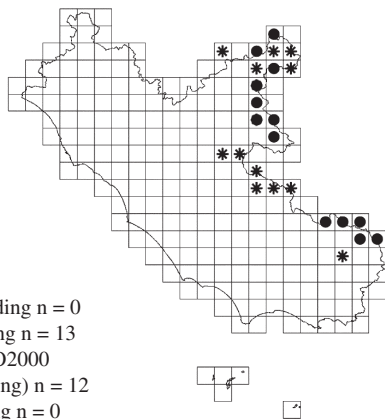
Chaffinch (*Fringilla coelebs*)



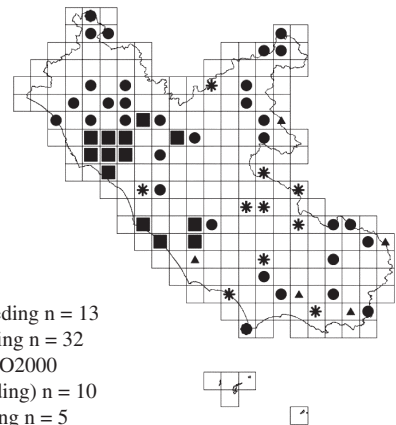
Blackcap (*Sylvia atricapilla*)



Yellowhammer (*Emberiza citrinella*)



Tawny Owl (*Strix aluco*)



**Figure 4.** Distribution map of Chaffinch (*Fringilla coelebs*), Blackcap (*Sylvia atricapilla*), Yellowhammer (*Emberiza citrinella*), Tawny Owl (*Strix aluco*) in Latium. Asterisks are data from MITO2000 collected during 2000-2006.

**RESULTS**

After the first surveys conducted in 2006, the data base of PAUNIL contained 37,348 records relating to 171 breeding species (77 non-Passerines and 94 Passerines): 22,848 were collected within the framework of MITO2000 activities, while the others (14,500 records) were collected in the first qualitative surveys. In 2006 90 RUs were surveyed with qualitative samplings, while quantitative samplings were ensured for 87 RUs during the period 2000-2006, for a total of 2,179 point counts.

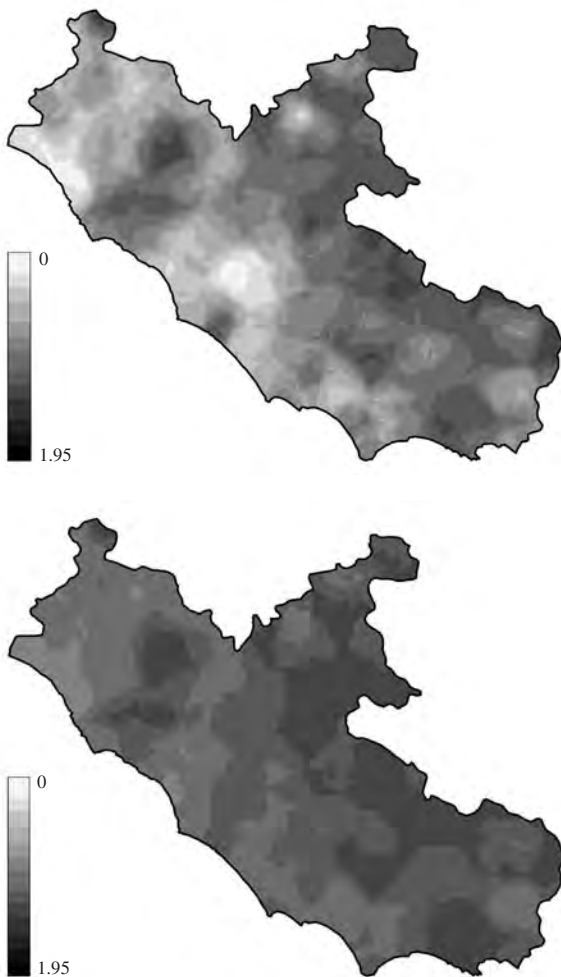
The 10 species with more sightings belong to Passerines (*Sylvia atricapilla*, *Turdus merula*, *Corvus corone cornix*, *Passer italiae*, *Fringilla coelebs*, *Parus major*, *Carduelis carduelis*, *Luscinia megarhynchos*, *Serinus*

*serinus* and *Hirundo rustica*) and represent widespread and common breeders in Latium. Seven species registered during the survey (*Ardea cinerea*, *Larus genei*, *Recurvirostra avosetta*, *Tringa totanus*, *Larus ridibundus*, *Riparia riparia* and *Picoides medius*) have still to be confirmed as breeders.

As of 2006, the average species richness for Recording Units was 47.3 species/RU (DS ± 17.8, range 1-94). In the former atlas the average richness was of 54.4 species per IGMI unit (DS ± 20.9, range 1-103 species). We considered the RUs included in the category of species 1-15, 16-30 as underestimated since these RUs are at present incompletely investigated (see also Fig. 3).

We compared the distribution of species richness resulting from PAUNIL with that resulting from the former





**Figure 5.** Quantitative distribution map (pairs/10 point counts) of Chaffinch *Fringilla coelebs* (above) and Blackcap *Sylvia atricapilla* (below), utilizing data from MITO2000 collected during 2000-2005.

PAL atlas (Fig. 3): both atlases showed the highest richness along the Apennines and pre-Apennines in the East, and in northern part of the region. This is probably related to the presence of continuous forested areas: the species richness calculated with PAL data showed a highly significant correlation with the extension of woodland ( $R_s = 0.4389$ ,  $p < 0.001$ ), and a significant inverse correlation with the presence of arable land and pastures ( $R_s = -0.211$ ,  $p < 0.05$ ).

Minor differences in this overall pattern are probably due to the lack of uniformity of PAUNIL data available at the present stage.

In figure 4 we show four examples of regional distribution of species as updated to 2006. The Yellowhammer and the Tawny owl both show a limited coverage, but their

low frequency depends on different reasons. The first species appears to be more localized, being distributed along the forests edges on the mountain ridge of the Apennines, while the distribution of the second one derives from the occupation of broad-leaved forest as primary habitat and by the secondary colonization of man-made habitats (Hagemeijer and Blair 1997). The distribution map of the latter (not yet surveyed with specific field work) is also probably affected by its low detectability due to its nocturnal habits.

On the contrary, both Blackcap and Chaffinch are widely distributed across Latium, from sea-level up to the highest altitudes. Examples of maps produced with an interpolation procedure are showed for these two species in figure 5. Although both species appear to be evenly present (see Fig. 4), the quantitative data reveal that the first one is generally more abundant.

The distribution pattern is very similar, with a higher abundance (pairs/point counts) in forested landscape and mountain areas and lower abundance or absence observed in some areas along the coastal plain and valleys. The Chaffinch seems almost absent also from more urbanised areas (the centre of Rome and Civitavecchia in the North-West of the region).

## DISCUSSION

In spite of the faunal impoverishment gradient along the Italian peninsula (Massa 1982), the Latium region hosts a good number of bird species that represent in fact 71% of the species breeding in Italy (see Meschini and Frugis 1993). This is due to the large variety of environments that are present throughout the region between the Tyrrhenian coast and the Apennine mountains (Fig. 1).

As compared with the previous atlas, the following main changes are observed: *Egretta garzetta*, *Ardea cinerea* and *Gyps fulvus* are new breeding species in the region; nesting of *Nycticorax nycticorax*, *Ardea purpurea* and *Aythya nyroca*, previously considered only possibly breeding, are confirmed; *Corvus corax* range expanded; first reproductive attempts of *Ciconia nigra* and *Tringa totanus*, although unsuccessful, are recorded; a decline in the distribution of *Emberiza hortulana* is observed. The data of *Egretta garzetta*, *Nycticorax nycticorax*, *Ardea purpurea* and *Ardea cinerea* confirm their population increase in Central Italy (Fasola *et al.* 2007). *Ciconia nigra*, *Aythya nyroca* and *Tringa totanus* are slightly increasing in Italy, whereas *Emberiza hortulana* is decreasing in Italy as in its whole European range (BirdLife International 2004). The expansion of *Gyps fulvus* and *Corvus corax* are related to

their reintroduction in areas surrounding the Latium region (Allavena *et al.* 1999).

Apart from differences pertaining to single species, the distribution of species richness in PAUNIL and in the former PAL atlas is similar. Both atlases showed the highest values of richness mainly along the Apennines and pre-Apennines, where woodland is more extended. Indeed, woodland distribution explains most of the bird species richness distribution.

The analysis of the Blackcap and Chaffinch examples seems to indicate that quantitative data add valuable information to the “presence-absence” approach. According to this approach, the distribution of the two species completely overlaps in the region. However, quantitative data highlight that Blackcap is more abundant than Chaffinch in all areas, and that only the latter species seems to avoid more urbanised areas.

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