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Short communication

## **Current distribution and population size of the Barred Warbler *Sylvia nisoria* in South Tyrol (Italy)**

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**Short title:** Barred Warbler in South Tyrol, Italy

### **Abstract**

The Barred Warbler *Sylvia nisoria* is a critically endangered breeding species in Italy, given the severe decline suffered in the last decades and the reduced population size. South Tyrol, an inner Alpine region, is the northernmost Italian breeding area of this warbler, but we lacked recent information about the distribution and population size. In this study, based on surveys carried out in the year 2019 and other recent observations, we assessed a very restricted current distribution of this warbler, and we estimated a population size of 10-30 pairs. We also observed a singing male at unusually high elevation. A comparison of our results to historical data suggests a strong reduction in distribution compared to the 1980s/1990s. The changes in agricultural practices of the last decades might have contributed to determine such decline. Appropriate conservation measures are urgently needed to try to avoid the local extinction of the species.

**Keywords:** Alps; farmland birds; montane grasslands; threatened Italian birds

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The Barred Warbler *Sylvia nisoria* is a migratory passerine bird breeding from Central Europe through Mongolia and Western China. In Italy, this warbler breeds at its western range limit, mostly at the Alps foothills and valleys in the North of the country (Brichetti & Grattini 2010). The Italian breeding population suffered a severe decline in the last decades, and the population size has been recently estimated in less than 100 pairs (Brichetti & Grattini 2010). For these reasons, the species is currently classified as ‘Critically Endangered’ at the national level (Peronace et al. 2012). In such a critical situation, detailed information about the distribution and abundance of this species is urgently needed for conservation. In this study, we present recent and detailed information about the Barred Warbler in South Tyrol, the northernmost Italian breeding area. This is an inner Alpine region, where the species was known to breed mainly on the dry and bushy slopes of the Venosta valley, and more sparsely in other areas (Niederfrininger et al. 1996). However, recent information is very scarce and exclusively based on occasional observations (Brichetti & Grattini 2010, AVK 2018), therefore the current local distribution and population size of the species are virtually unknown. In the neighbouring Trento province, recent surveys allowed detecting 13-15 breeding pairs in the Fiemme valley and 5-9 in the Non valley, with more scattered observations in other areas, and the species is probably declining (Assandri G. & Pedrini P./MUSE, unpub. data).

During the year 2019, we surveyed Barred Warblers (as well as other farmland bird species) across 20 study areas in South Tyrol, overall covering approximately 1,600 ha (mean study area extension = 80.6 ha, range = 23.5 – 124.8 ha). These areas were located between 700 and 1950 m, and all included bushy areas and/or hedgerows, within a matrix of open habitats like meadows, pastures or fields. Each study area was surveyed twice, the first between 25 May and 19 June and the second between 20 June and 15 July, with at least 10 days elapsing between visits at the same area. We expected low Barred Warbler breeding density, hence we used a standardized playback procedure to improve detectability (1 minute of stimulation followed by 1 minute of listening). This procedure was carried out across the entire study area, in correspondence of potentially suitable nesting habitat (i.e., occurrence of bushes/low trees, Brichetti & Fracasso 2010), and at a minimum distance of 200 m between individual playback points. Given the territory size of the species (0.11 – 2.59 ha, Aymí et al. 2020), such a distance should effectively prevent double counts, and at the same time, it should provide an adequate density of playback points. To complement our survey data, we also considered the very few occasional observations of Barred Warblers available from the database of the Museum of Nature South Tyrol (hereafter MNST) for the last five years (2015-2019), as well as one observation from the Biodiversity Monitoring South Tyrol (Eurac Research) in the year 2019. These additional records are referred to singing males observed in June.

We observed Barred Warblers at 6 out of 20 study areas, and we mainly detected singing males (overall, 8 during the first survey period and 6 during the second one). In the study areas where we detected the species, densities were very low and ranged between 0.1 and 0.4 males/10 ha. In most cases, birds were observed during both survey sessions and approximately at the same locations, indicating that they were more likely breeding individuals rather than late migrants or prospecting males without a territory/mate. One singing male was observed on 14 June at 1840 m, an unusually high elevation for this species (see Brichetti & Fracasso 2010). This observation occurred near the main Alpine watershed, on southeast-facing pastures with scattered bushes and trees (mainly young conifers) in the municipality of Moso in Passiria. We did not find any records at similar or higher elevations for Italy and for the Alps in the literature, while an observation at 1900 m is reported in the MNST database (20 June 2000, 3 singing males; O. Niederfriniger).

Based on our surveys and other aforementioned data, the Barred Warbler still occurs during the breeding season in restricted areas of South Tyrol (Fig. 1), i.e., several areas of the Venosta valley and few scattered sites in the Isarco, Pusteria and Passiria valleys, with a minimum population size of 10 breeding pairs. We could not check some other potentially suitable sites, and especially the high Venosta valley could host more breeding pairs than we detected. Even so, in our opinion a population size larger than 30 pairs is highly unlikely because we sampled a large part of the few areas in South Tyrol that still maintain adequate habitat characteristics for the species, detecting very low densities.

Comparing our results to the past Barred Warbler distribution and abundance in South Tyrol is problematic, as the data available for the past decades almost only consist in occasional observations, or in episodic surveys of restricted areas (Brichetti & Grattini 2010, AVK 2018). Even so, a temporally explicit map for the period 1980-2010 (from MNST database) and the current estimated distribution (Fig. 1) clearly suggest a strong range restriction. In addition, previously published density data and the number of individuals recorded per site during some occasional observations strongly suggest higher abundance than indicated by our surveys, at least until the 1990s (e.g., 12-15 singing males/30 ha, Berg-Schlosser 1981; 5 pairs along 0.5 km of hedgerows, Niederfriniger et al. 1996). The assumed decrease is consistent with the strong decline observed at a national level. The causes of this decline in Italy are not completely clear, but could include agriculture intensification (i.e., removal of hedgerows and bushes, pesticide use) and land abandonment, as well as environmental and climatic changes in the wintering areas (Brichetti & Grattini 2010, Nardelli et al. 2015). Comparably in South Tyrol, the Barred Warbler population decline is probably related to a combination of agricultural intensification and land-use changes, as

the traditional heterogeneous and low-intensity farmed landscape has been widely replaced by intensively managed apple orchards, vineyards and hay meadows, while less productive and accessible grasslands were partly abandoned (Tasser et al. 2007). As an example, the dry grasslands of Venosta valley, which represented a wide and continuous suitable area for the Barred Warbler, were largely abandoned (more than 70%) and replaced by forests starting from the 1960s (Tasser et al. 2007). Despite its reduction, the Barred Warbler population of South Tyrol has national relevance, given the low number of pairs breeding in Italy. Therefore, we encourage the local authorities, in collaboration with the relevant stakeholders, to implement the appropriate conservation measures to avoid the local extinction of this species, such as promoting low-intensity grazing and farming practices and maintaining and correctly managing the remaining hedgerows and bushy areas (see, e.g., Brambilla & Pedrini 2014). These measures would benefit also several other bird species with similar ecological requirements (e.g., Ceresa et al. 2012, Brambilla & Pedrini 2014, Assandri et al. 2019 a,b). We strongly warn against further land-use changes from grasslands to orchards and berries cultivations, as well as against further removals of marginal elements such as bushes, hedgerows and patches of untilled vegetation.

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**Figure 1.** Past (a) and current (b) distribution of the Barred Warbler in South Tyrol, Italy. The past distribution (1980-2010) has been assessed by conservatively selecting occasional observations, trying to avoid including migratory individuals (we mostly used records from June and July). The current distribution has been assessed by targeted surveys (year 2019) and few recent occasional observations. Black squares: 2x2 km occurrence cells; circles: survey areas where the species was not detected.

