ACTA ORNITHOLOGICA
Vol. 43 (2008) No. 2

SHORT NOTES

Densities and habitats of the Tawny Pipit *Anthus campestris* in the Wielkopolska region (W Poland)

Jerzy GRZYBEK, Ireneusz MICHALAK, Tomasz S. OSIEJUK & Piotr TRYJANOWSKI*

Department of Behavioural Ecology, Adam Mickiewicz University, Umultowska 89, 61–714, Poznań, POLAND
*Corresponding author: e-mail: ptasiek@amu.edu.pl

Grzybek J., Michalak I., Osiejuk T. S., Tryjanowski P. 2008. Densities and habitats of the Tawny Pipit *Anthus campestris* in the Wielkopolska region (W Poland). Acta Ornithol. 43: 221–225. DOI 10.3161/000164508X395342

Abstract. The material was collected in a large plot (100 km^2) in west-central Poland in 2004–2005. The average density was 85.5 breeding pairs/100 km^2 and was similar during both years of the study. The vegetation structure (visibility of the territory surroundings, and height and density of the under-storey vegetation) was described for 82 pipit territories in 2004, and for 33 additional territories in 2005. The same information on habitat variables was collected in randomly selected localities. Tawny Pipits use nesting sites with very short vegetation and with a high number of areas free of vegetation or only covered with dry mosses. The available data on the Tawny Pipit's habitat in different European localities show that the species is able to occupy a much wider range of habitats. Destruction of habitats, for example, for the construction of a new motorway, influenced pipit numbers and distribution in the study area; even so, the studied population remains the densest and most stable in the geographical range of the species. Although the study area contains Tawny Pipits and other interesting species from a conservation point of view, protection of the land may be very difficult owing to changes in habitats that are being destroyed both by infrastructure investments, and also by the financial support farmers receive from the European Union, which allows them to cultivate more land and thus destroy bird habitats.

Key words: Tawny Pipit, *Anthus campestris*, breeding ecology, Common Agricultural Policy, conservation troubles, density, farmland, habitat use

Received — June 2007, accepted — Febr. 2008

During the past few decades, populations of the Tawny Pipit have decreased markedly in Europe (Hagemeijer & Blair 1997, van Turnhout 2005). Changes in land use, deterioration of breeding habitats and, linked with this, a decrease in the potential food base were suggested to be responsible for this dramatic decline (Krüger 1989, Hagemeijer & Blair 1997, van Turnhout 2005). Currently stable and numerous populations of the Tawny Pipit still occur in Spain, Italy and Ukraine (Hagemeijer & Blair 1997, Ålstrom & Mild 2003). The status of the Polish population of the Tawny Pipit is unclear. Some results support the general view that it is a declining species, but others do not (review in: Tomiałojć & Stawarczyk 2003).

Although habitat destruction appears to be the main factor resulting in the Tawny Pipit population decline, other factors, such as demography and/or climate change may play an additional role (Krüger 1989, Ålstrom & Mild 2003, van Turnhout 2005). However, the problem with understanding Tawny Pipit population dynamics (and their clear implications for conservation) in the future is the lack of good data on their biology and ecology, even basic information such as habitat selection and population densities (Krüger 1989, Bijlsma 1990, Hagemeijer & Blair 1997, Ålstrom & Mild 2003, van Turnhout 2005). The majority of studies in Western Europe were performed on small declining populations and were limited to very small sample sizes (e.g. Bijlsma 1990, Ålstrom & Mild 2003, van Turnhout 2005, but see also Suárez et al. 2005a).

Conservation projects which focus only on one species are not sufficient. Thus during this field study we also noted other bird species living in the Tawny Pipit territories. This may be important for two reasons: 1) because interspecific relationships influence the Tawny Pipit's' behaviour and habitat selection (cf. Telleria et al. 1988, Zamora 1990, Suárez et al. 1993, Ålstrom & Mild

2003, Kumstátová et al. 2004), and 2) because if other species of a strong conservation importance live in the same kind of habitats, it will be easier to provide general solutions to protect the study area (Delgado & Moreira 2000).

Therefore, the aims of this study were to provide general information about density, distribution pattern, habitat use and some elements of the behaviour of the Tawny Pipit in the dry farmland landscape of central Poland, and to compare this with other populations. We also believe that the presented results might give a picture of the condition of the Tawny Pipit population immediately after Poland joined the European Union and adopted the Common Agricultural Policy, when there is still a possibility of changing some EU legal regulations.

The material was collected near the town of Koło (size 100 km^2, 52°12'N, 18°39'E) during 2004–2005. The study areas consisted of agricultural land made up of arable fields, meadows (containing trees) and small woodlots. The soil is of very low quality — a large percentage of land is not used by farmers because of the high proportion of sand and gravel. Another characteristic of the study plot landscape is that it contains recultivated brown-coal mines, as well as large gravel pits. In early spring 2005, 4.2 km^2 in the northern part of the study plot was greatly changed during the building of a new motorway. Changes included the destruction of short grass cover, caused by the movement of bulldozers and of people building the motorway.

The study plots were surveyed from the pre-breeding period (end of April) and the movements of birds and boundaries of territories were mapped. We also tried to find nests, but this was extremely difficult, because ground-nesting birds generally suffer from high rates of predation (including the Tawny Pipit — see Suárez et al. 1993, 2005a, b). Once we had found a nest, we decided not to re-visit it in the future. Therefore our information on breeding biology and ecology is very limited, and data on nests were used mainly to establish nest location in relation to the centre of the territory. The territory centre was established as the centre of a polygon bordered by the singing, fighting and foraging activity of the birds.

In 2004 in 82 pipit territories and in 2005 in 33 territories (only new territories compared to the previous years were used) we described the vegetation structure, paying special attention to habitat structures potentially important to Pipits (after Krüger 1989, Kumstatova et al. 2004) such as visibility of the territory surroundings, and height and density of under-storey vegetation. The same information was collected on habitat variables in locations selected randomly (n = 115, respectively 82 in 2004 and 33 in 2005). All habitat variables were collected in the field in the middle of May in both seasons. Visibility of territory borders were established as the percentage of tree and bush cover on the horizontal line on a digital photo taken with respect to the main geographical directions (N, S, E, W) from the centre of the territory or randomly selected point. Data on visibility were presented with an accuracy of 10% and averaged for the territory. The height of vegetation (accurate to 10 cm) and density (defined as the amount of ground covered by plants higher than 5 cm, expressed with an accuracy of 10%) were measured at four representative spots (25 m^2) within each territory and averaged.

Singing Tawny Pipits were observed between the first half of May and the end of June. In the case of singing males, we noted the type of song post, divided into five categories (in flight, tree, bush, electric line, ground). In order not to present only a summary of the results and to avoid the problem of pseudoreplication possibly skewed to territories with a higher number of observations (due to birds' activity and/or the weather), we also used a number of territories where a number of given song posts were observed. Moreover, some males were recorded and this study of vocalisation pattern is published separately (Osiejuk et al. 2007).

To improve the sample size, for the majority of analyses (excluding changes in density and occupancy pattern) data from two study years were pooled. All calculations were performed using the SPSS v. 12 software.

The density of breeding pairs on the plot was stable, and varied between 2004 and 2005 from 86 to 85/100 km^2 respectively. Among 113 breeding territories recorded on the plot during two years of study, 58 (51.3%) of them were used in both seasons. In 2004 13 of 73 territories were established in the part of the study plot destroyed in the next spring by workers building the motorway. In these places only 4 of 81 territories found in 2005 survived. Therefore, territory distribution between years differed significantly with a strong tendency to avoid the area under the prepared motorway (χ^2 with Yates correction = 4.08, $p = 0.043$).

Tawny Pipit territories were located in habitats with very low dry vegetation, with small patches not covered by plants (patches of sand, open ground, roads, dunes etc.). The Tawny Pipit territories differ significantly from the random locations in all three studied habitat variables (Table 1).

During the study period the data on the location of Tawny Pipit nests were collected and all nests were located in areas where grass patches were denser than the mean value for the territory (64.5 ± 30.5 vs. 46.5 ± 31.1%, in the radius 3m from the nest and random value for the territory, respectively, Wilcoxon test, $Z = -2.81$, $p < 0.005$). 10 of 11 (91%) of nests were located in the territory margin (binominal sign test, $p = 0.012$), not in the centre of the singing and foraging activities of both sexes.

In total, in 85 territories we noted 261 territorial songs. The Tawny Pipit sings mainly in a characteristic flight song (Table 2), the most common places for non-flight songs were electrical lines and trees (Scots Pine *Pinus sylvestris* and Pear Tree *Pyrrus communis*).

In 72 pipit territories during field work we also found sixteen other (1–5 per one territory, mean ± SD = 2.53 ± 1.62) bird species. Species important from a conservationist's perspective included (Natura 2000 list species): Woodlark *Lullula arborea* which occurred in 33.3% of Tawny Pipit territories, Red-backed Shrike *Lanius collurio* (16.7%) and Ortolan Bunting *Emberiza hortulana* (2.8%).

Results presented in this paper support former findings (used partially by Tomiałojć & Stawarczyk 2003) that in the study area there occurs a dense and so far stable population of this rapidly declining species. Moreover, breeding densities noted in the study plot are amongst the highest recorded in Europe (Krüger 1989, Goławski & Lewartowski 1993, Hagemeijer & Blair 1997, Ålstrom & Mild 2003, van Turnhout 2005). Also, data from the surroundings of the study plot suggest that many more breeding pairs live in abandoned fields and open coal mines. Therefore, we estimated a local population of at least 250 breeding pairs living in an area ca. 700 km^2, which looks like the most important metapopopulation for the species on the global scale.

Table 2. Type of song sites used by the Tawny Pipit (N = 85 territories with observations on song posts and 261 territorial songs).

Song post	% territories	% territorial songs
None (song in flight)	58.8	68.6
Electrical lines	25.9	19.2
Trees	14.1	6.9
Bushes	1.2	0.2
Ground	9.4	5.0
Total	100	100

Some studies performed on Pipits have reported a clear negative impact of land use intensification on Pipit populations (Hagemeijer & Blair 1997, Ålstrom & Mild 2003, van Turnhout 2005), especially intensification of agriculture (Hagemeijer & Blair 1997, Ålstrom & Mild 2003, van Turnhout 2005). However, other local factors such as the increase of recreation and camping, the conversion of abandoned farmland to forestry, eutrophication of habitats and their influence on decreasing the food base (Bijlsma 1990, van Turnhout 2005), and even construction of new motorway (as documented in this study) can also play an important role. Interestingly, the Tawny Pipits disappear from extremely changed parts of the study plot, but are not removed from the study plot completely. Instead they changed territory positions, moving to less populated places in the same study plot.

For its survival, the Tawny Pipit needs two important territory components: 1) foraging places, mainly open dry ground, and 2) sites for nest location with more dense grass vegetation (Krüger 1989, Bijlsma 1990, van Turnhout 2005, our results). Nests are often outside the centre of territories, where the majority of foraging and singing activities took place (see our results and Krüger 1989, Bijlsma 1990). This is in agreement

Table 1. Characteristics of territories of the Tawny Pipit and random locations. Mean (median), ± standard deviation (SD), Z-values and probability of Wilcoxon test are given.

Variable	Territory	Random location	Z	p
Visibility of territory borders (%)	22.8 (16.7) ± 21.9	37.3 (35.0) ± 32.3	-2.98	0.003
Plant height (cm)	22.6 (21.3) ± 11.8	55.5 (25.0) ± 70.8	-2.72	0.006
Plant cover (%)	60.0 (60.0) ± 24.2	68.2 (70.0) ± 23.6	-2.50	0.012

with the findings of other authors (Hagemeijer & Blair 1997, Ålstrom & Mild 2003, van Turnhout 2005) that habitats under the early stages of succession, such as open charcoal mines and unforested inland dunes are attractive to the Tawny Pipit (Krüger 1989, Hagemeijer & Blair 1997, Ålstrom & Mild 2003). However, although in the studied area a part of the habitat looks quite typical for the Tawny Pipit, interestingly a large part of the local species population lives on very extensively used farmland, with human agricultural activities limited to traditional pastoralism and growing rather low quality cereals in dry, sandy ground (see also below).

From a conservationist's point of view the Tawny Pipit is not the only interesting bird species living here. Part of the study area is covered by interesting habitats listed by the network Natura 2000, such as psammophytes inland dunes, dominated by Grey Clubawn Grass *Corynephorus canescens*. However, we are rather sceptical of the effectiveness of the protection of this area. There are two reasons for this. Firstly, the northern part will be affected by the construction of the motorway and other development, and secondly, after joining the EU, farmers started ploughing the ground and using previously abandoned fields, due to the support of agro-schemes. However, maybe due to low soil quality, agricultural outputs will also be low and plots covered by cereals or Serradella *Ornithopus sativus*, which are quite popular farming plants and acceptable for the Tawny Pipit (our direct observations in the field) should be preserved. We also hope that a great part of the population can survive in open charcoal mines surrounded by farmland, which is the main habitat of the species in Eastern Germany (Krüger 1989).

To conclude, our study shows that so far, the local population of the Tawny Pipit in central Poland is dense and looks stable and in good condition, however the situation in the future is not clear. The presented results are important to the Polish population of this rapidly declining species, and for other European populations especially in the western part of the continent (see suggestions in van Turnhout 2005).

ACKNOWLEDGEMENTS We would like to thank M. Antczak, L. Carrol, S. Owczarczak-Garstecka and V. Takacs for valuable comments and suggestions that improved previous versions of the manuscript.

REFERENCES

Ålstrom P., Mild K. 2003. Pipits and wagtails of Europe, Asia and North America. Helm, London.

Bijlsma R. G. 1990. Habitat, territory size and breeding success of Tawny Pipit *Anthus campestris*. Limosa 63: 80–81.

Delgado A., Moreira F. 2000. Bird assemblages of an Iberian cereal steppe. Agric. Ecosyst. Environ. 78: 65–76.

Goławski A., Lewartowski Z. 1993. [The most numerous breeding sites of the Bank Swallow *Riparia riparia* and Tawny Pipit *Anthus campestris* in Północne Podlasie Loweland]. Chrońmy Przyr. Ojcz. 49: 108–111.

Hagemeijer J. M., Blair M. J. (eds). 1997. The EBCC Atlas of European Breeding Birds: their distribution and abundance. Poyser, London.

Krüger S. 1989. Der Brachpieper. Ziemsen, Wittenberg.

Kumstátová T., Brinke T., Tomková S., Fuchs R., Petrusek A. 2004. Habitat preferences of tree pipit (*Anthus trivialis*) and meadow pipit (*A. pratensis*) at sympatric and allopatric localities. J. Ornithol. 145: 334–342.

Osiejuk T. S., Grzybek J., Tryjanowski P. 2007. Song structure and repertoire sharing of the Tawny Pipit *Anthus campestris* in Poland. Acta Ornithol. 43: 157-165.

Suárez F., Morales M. B., Mínguez I., Herranz J. 2005a. Seasonal variation in nest mass and dimensions in an open-cup ground-nesting shrub-steppe passerine: the tawny pipit *Anthus campestris*. Ardeola 52: 43–51.

Suárez F., Traba J., Herranz J. 2005b. Body mass changes in female tawny pipits *Anthus campestris* during the nesting stage. J. Ornithol. 146: 372–276.

Suárez F., Yanes M., Herranz J., Manrique J. 1993. Nature reserves and the conservation of Iberian shrubsteppe passerines: the paradox of nest predation. Biol. Conserv. 64: 77–81.

Telleria J. L., Suarez F., Santos T. 1988. Bird communities of the Iberian shrubsteppes. Holarc. Ecol. 11: 171–177.

Tomiałojć L., Stawarczyk T. 2003. [The Avifauna of Poland. Distribution, numbers and trends]. PTOP "pro Natura", Wrocław.

van Turnhout C. 2005. The disappearance of the Tawny Pipit *Anthus campestris* as a breeding bird from the Netherlands and Northwest-Europe. Limosa 78: 1–14.

Zamora R. 1990. Interspecific aggression by the Wheatear in high-mountain passerine community. Ornis Scand. 21: 57–62.

STRESZCZENIE

[Zagęszczenia i siedliska wykorzystywane przez świergotka polnego w Wielkopolsce]

Materiał zbierano w latach 2004–2005, na dużej powierzchni badawczej (100 km^2) położonej w okolicy miasta Koło w środkowej Polsce. Średnie zagęszczenie wynosiło 85.5 terytoriów/100 km^2 i było bardzo podobne w obu sezonach lęgowych. Zagęszczenia te należą do najwyższych w Europie, a porównanie z historycznymi danymi pochodzącymi z badanego obszaru sugerują, że lokalna populacja jest stabilna. Terytoria świergotka polnego zlokalizowane były w miejscach z suchą niską roślinnością, przy czym ważne było występowanie także fragmentów niepokrytych

roślinnością, np. miejsc z piaskiem po wykopach, wydm śródlądowych, dróg polnych. Terytoria świergotka różniły się istotnie od punktów losowych zlokalizowanych na powierzchni badawczej pod względem wszystkich trzech analizowanych parametrów — pokrycia granic przez drzewa i krzewy, wysokości roślinności i pokrycia roślinnością (Tab. 1).

W trakcie badań znaleziono 11 gniazd tego gatunku; zdecydowana większość z nich położona była daleko od centrum terytoriów, w miejscach z gęstszą trawa niż w losowo wybranych miejscach terytorium.

W 85 terytoriach zanotowano 261 terytorialnych śpiewów samców, większość z nich wykonywana była w locie, ale świergotki czasem śpiewały także siedząc na liniach energetycznych lub drzewach (Tab. 2).

Z punktu widzenia ochrony przyrody, miejsca występowania świergotka polnego, ale także innych gatunków ekstensywnego krajobrazu rolniczego są niezwykle trudne do ochrony. Często są one uważane za nieużytki i z łatwością przeznaczane na inwestycje budowlane, czy jak w przypadku badanej populacji — pod inwestycje drogowe. Również dotacje dla rolników w ramach pomocy finansowej dla obszarów wiejskich oferowanych przez Unię Europejską, powodują silne przekształcenia takich miejsc (np. orka i zasiewy nawet na gruntach najsłabszej jakości).