



## The distribution of the Keeled Plump Bush-cricket (*Isophya costata*, Brunner von Wattenwyl, 1878) in the Natura 2000 site “Weinviertler Klippenzone”

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### Abstract

The Keeled Plump Bush-cricket (*Isophya costata*) is included in the EU – Habitats directive. It reaches its northwestern-most range limit in Austria, in the Weinviertel, where its largest population occurs in the Natura 2000 site “Weinviertler Klippenzone”. The first occurrences were discovered there in 2000 (Buschberg) and 2003 (Michelberg), and targeted surveys in suitable habitats eventually took place in the entire Natura 2000 area in 2017 and 2018. No further records were found outside the known area of occurrence. Despite the targeted search and appropriate sampling effort, the population on the Michelberg remained limited to a very small area near the summit. The situation is different on the Buschberg, where the dry grasslands are widely populated. The population on the Michelberg is endangered due to its small size and due to unsuitable dry grassland management in the form of mulching. The population on the Buschberg, meanwhile, does not appear endangered at the moment, provided that current grassland management practices and the late cutting date (ideally after 1 July) are maintained.

**Keywords:** Austria, conservation, distribution, Barbitistini, Phaneropterinae, Tettigoniidae

### Zusammenfassung

**Verbreitung der Plumpschrecke (*Isophya costata*, Brunner von Wattenwyl, 1878) in der Natura 2000 Fläche “Weinviertler Klippenzone”.** Die Breitstirnige Plumpschrecke (*Isophya costata*) ist auf der EU-Fauna-Flora-Habitat-Richtlinie gelistet. Sie erreicht im Weinviertel ihre nordwestliche Verbreitungsgrenze in Österreich, wo ihre größten Vorkommen im Europaschutzgebiet „Weinviertler Klippenzone“ liegen. In den Jahren 2000 (Buschberg) und 2003 (Michelberg) konnten hier die

ersten Vorkommen entdeckt werden, 2017 und 2018 fanden schließlich im gesamten Europaschutzgebiet gezielte Erhebungen in geeigneten Lebensräumen statt. Außerhalb der bereits bekannten Vorkommen gelangen keine weiteren Nachweise. Die Population auf dem Michelberg blieb auch trotz gezielter Nachsuche und angemessenem Aufwand auf ein sehr kleines Areal im Gipfelbereich beschränkt. Anders zeigte sich das Bild auf dem Buschberg, wo die hier vorhandenen Trockenwiesen großflächig besiedelt werden. Der Bestand auf dem Michelberg ist aufgrund der geringen Populationsgröße sowie der ungeeigneten Trockenrasenpflege in Form von Mulchen gefährdet. Die Vorkommen auf dem Buschberg scheinen dagegen aktuell nicht gefährdet zu sein, sofern die Wiesenbewirtschaftung sowie der späte Schnittzeitpunkt (ideal nach 1. Juli) beibehalten werden.

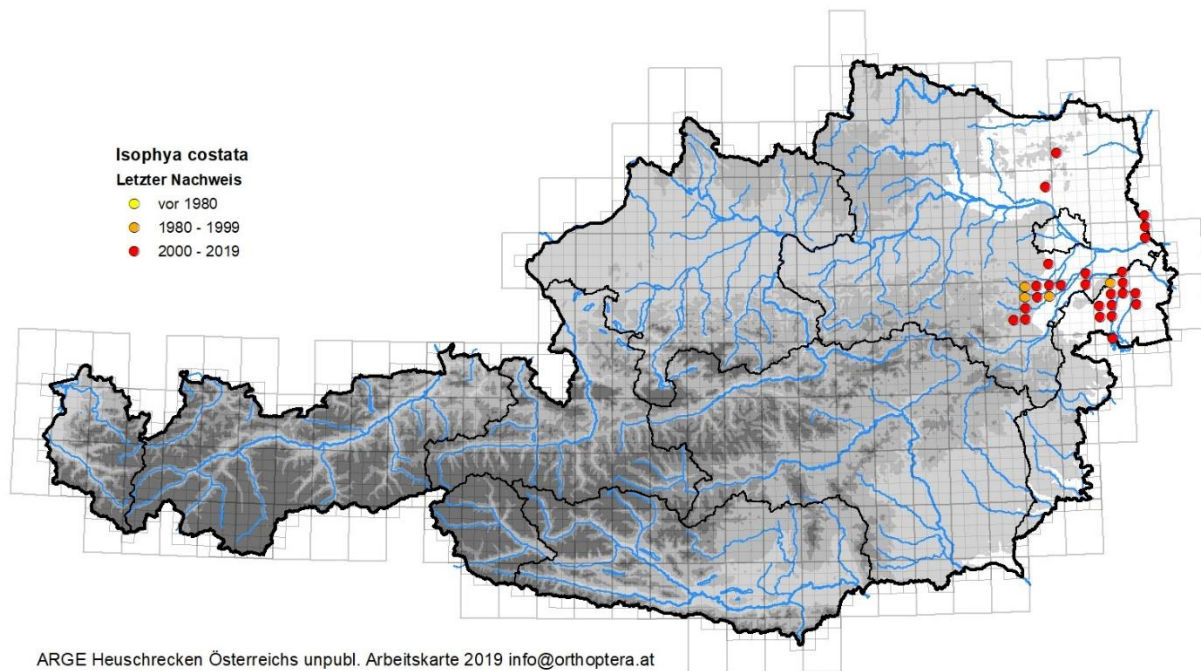
**Schlüsselwörter:** Barbitistini, Österreich, Phaneropterinae, Schutz, Tettigoniidae, Verbreitung

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## Introduction

The range of the Keeled Plump Bush-cricket is largely limited to the Carpathian Basin (Bauer & Kenyeres 2006) and only surpasses this limit in Eastern Austria (Bieringer 2009, 2017). The focal point of distribution in Austria mainly lies south of the Danube, and comprises a clearly defined area along the “Thermenlinie” (“the line of geothermal activity between the Vienna Basin to the East and the foothills of the Alps to the West”) south of Vienna, with the locus typicus on the Eichkogel near Mödling (this population is, however, already extinct!), across the “Feuchte Ebene” (“wet plain south of Vienna”) and the Leitha Mountains, all the way to the Hainburg Mountains and the Lake Neusiedl area. North of the Danube, there is an occurrence on alluvial meadows along the lower Morava river between Marchegg and Markthof (Bieringer 2009, 2017; Datenarchiv ARGE Heuschrecken Österreichs) and between Vysoká pri Morave and Devínská Nová Ves on Slovak bank of the river (Nuhlíčková et al. 2017, Nuhlíčková et al. 2021). Approximately 50 km (west)-northwest, in the Natura 2000 site “Weinviertel Klippenzone” (Site Code: AT1206A00), two further occurrences are known (Fig. 1), which are simultaneously the northwestern-most outposts of the species’ entire range (Bieringer 2009, 2017). The species was discovered there in 2000 on the Zahlberg in the “Leiser Berge” (“Leiser Mountains”) (Korneuburg district) and was followed by the discovery of the population on the Michelberg east of Haselbach in 2003 (Korneuburg district; both H.-M. Berg, ARGE Heuschrecken Österreichs data archive).

*Isophya costata* is considered “endangered” in Austria (Berg et al. 2005), where it is listed as one of four orthopteran species in Annexes II and IV of the EU Habitats Directive and is therefore a species of “Community interest”. As a result, in addition to the designation of protected areas (Natura 2000 sites), there is a responsibility and obligation to establish conservation measures to safeguard threatened populations. A necessary precondition for such measures, however, is precise knowledge of the species’ distribution. In order to establish this basis, extensive mapping



**Fig. 1:** Distribution of *Isophya costata* in Austria (Author: T. Zuna-Kratky).

was carried out in all suitable habitats of the Weinviertel “Klippenzone” (“cliff zone”), especially in 2017 and 2018.

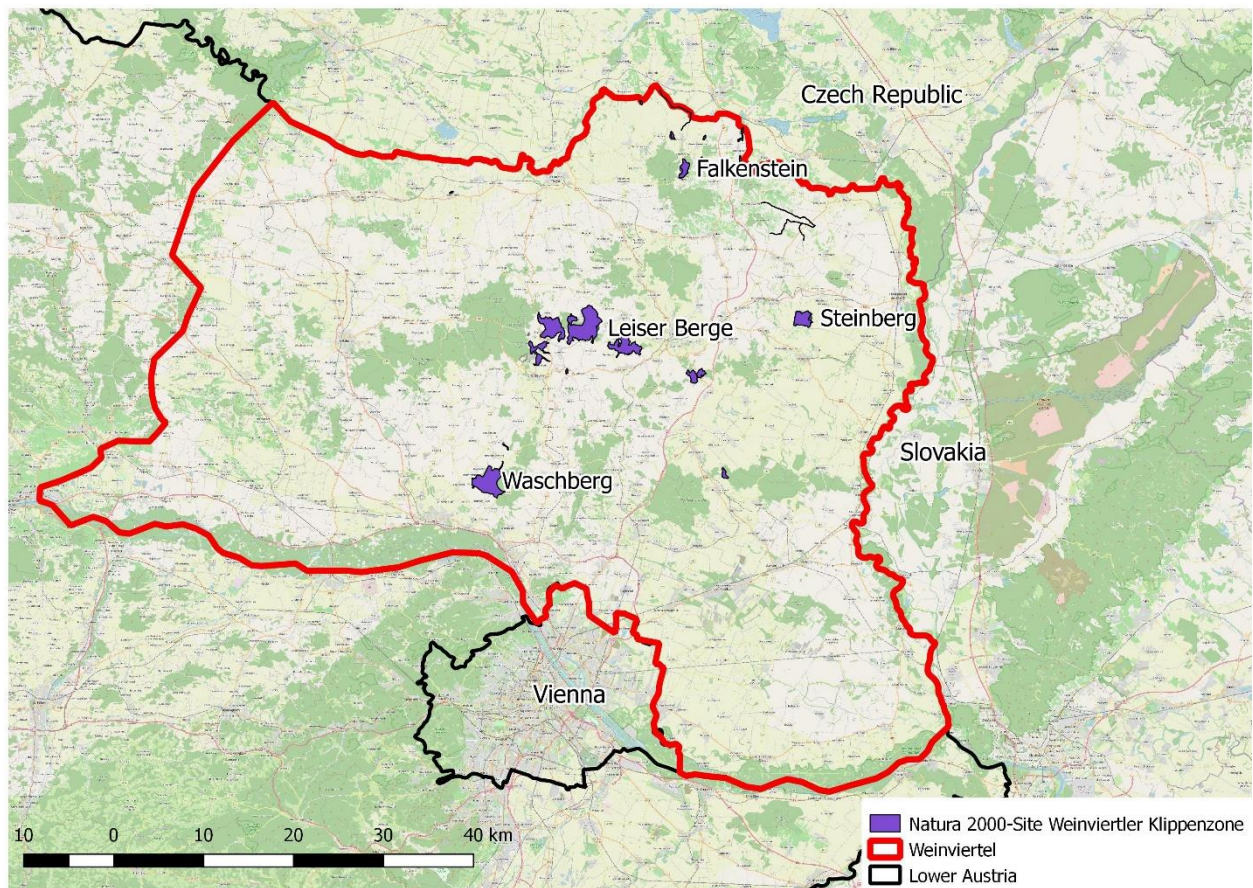
## Material and methods

### Survey area

The Natura 2000 site “Weinviertler Klippenzone” currently consists of 24 sub-sites (Fig. 2). These are spread out across the eastern Weinviertel, with a focus around the Rohrwald forest, the Leiser Mountains, the Steinbergwald forest and the triangle between Falkenstein – Steinebrunn – Wildendürnbach. The total area of this Natura 2000 site is approx. 3.400 ha, with elevations ranging between 195 m and 492 m and a pannonicly influenced climate. Winters lack significant quantities of snow, and there are regular cold spells with persistent frost, lasting several days and weeks. Summers, on the other hand, are relatively hot and also experience the highest rainfall throughout the year, though mostly in the form of heavy rainfall events. Annual precipitation is 400–500 mm, and average annual temperature is approx. 10 °C.

The area owes its name to the limestone cliffs with pronounced patches of limestone grassland pioneer communities that appear in several places. From this extreme habitat, there are fluid transitions through semi-arid grasslands, dry meadows, downy oak forests to large, closed oak forest areas. The latter cover a major part of the area, while the most extensive grassland areas are found in the Leiser Mountains.





**Fig. 2:** Location of the Natura 2000 site “Weinviertler Klippenzone”.

## Sampling

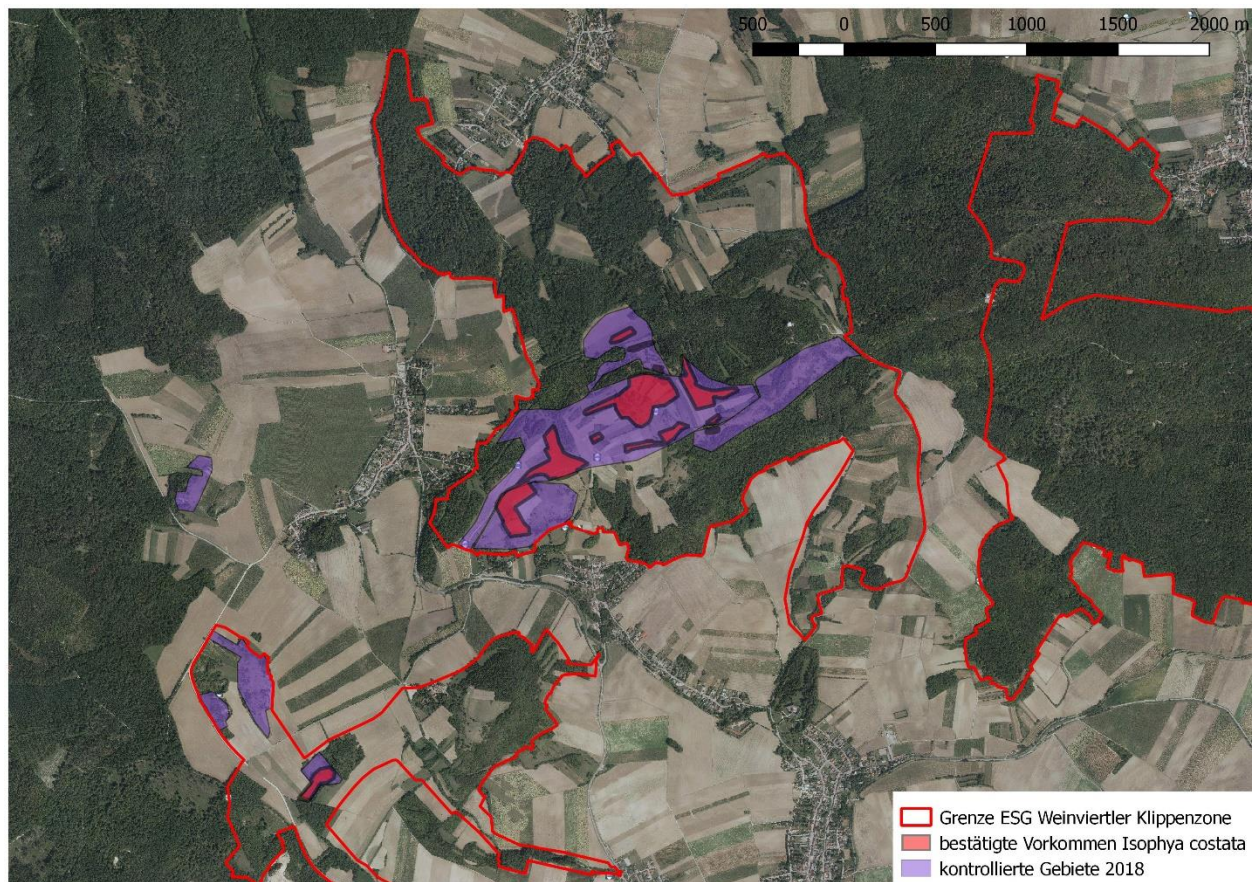
Based on the known habitat types occupied by the species in Austria and the specific habitats found at the species' occurrence area within the Weinviertel cliff zone, it was possible to select those localities where *Isophya costata* could potentially occur. These were the Michelberg, the Waschberg and the Buschberg, as well as the arid grasslands near Falkenstein, Ottenthal and Wildendürnbach.

Targeted searches for the species occurrence always began in the late afternoon and evening between 18:00 and 22:30 h. The routes were planned so that as many suitable areas as possible could be acoustically monitored using an ultrasound (bat) detector (set at 20 kilohertz). If a widespread occurrence (abundant population) was detected, it was mapped accordingly, while individual animals were marked with a GPS point.

Surveys were conducted on the following days:

2017: 18.6. (Buschberg), 20.6. (Waschberg, Michelberg), 21.6. (Zeiserlberg, Heidelberg, Falkenstein); 2018: 13.6., 19.6., 20.6., 2.7. (all Buschberg, Fig. 3).





**Fig. 3:** Surveyed areas and confirmed occurrences of *Isophya costata* on the Buschberg; Red lines: N2000 site “Weinviertler Klippenzone”, Pink: confirmed occurrences of *Isophya costata*, Purple: Surveyed areas 2017 and 2018 (Source: Geoimage).

## Results

The surveys were able to confirm the two known occurrences on the Michelberg and the Buschberg, while no new records were found in the rest of the area. The population on the Michelberg is located in the summit area (alt. 400-420 m) and consists of very few individuals. Three singing males were found there on 20 June 2017, while the two surveys in 2003 had detected seven (10 June) and six (27 June) males, respectively (H.-M. Berg, Austrian Orthoptera mapping archive). The population on the Buschberg is considerably larger and covers a greater area (Fig. 3). Along the ridge running southwest-northeast, there is a relatively large area of dry grassland, much of which is occupied by *Isophya costata* (Fig. 4). A little distance from there, a previously unknown population was found on a dry fallow and adjacent semi-arid meadow southwest of Oberleis (Fig. 3). Both populations together cover a total area of approx. 20 ha. The 2017 survey, which only covered part of the total area (approx. 7 ha), estimated the population size at a minimum of 100 singing males. Extrapolating these numbers, the actual population size is probably around 200-300 singing males. When the male-female ratio is 1:1, we expect the population size to be 400-600 individuals. It was remarkable that only a fraction of these could be found during the significantly larger follow-up survey in 2018.

Only isolated males were heard in most cases, which indicates a strongly fluctuating population (Bieringer 2017).

The preferred habitat is predominantly high and rather herb-rich dry meadows (Figs. 5 and 6). The vegetation is usually a little denser than in the adjoining semi-arid meadows, but not matted. Almost all of the plots are dry meadows that are mown 1–2 times per year. The first cut in 2018 was done at the end of June. The dry fallow southwest of Oberleis was cut in July or August in 2018 – well after the occurrence of this bush-cricket species, which appears very early in the season, in the end of spring and beginning of summer (middle of June). The habitat also corresponds to the main habitat in the Hungarian Plain, namely steppe meadows rich in dicotyledonous plant species (assumed to be the original habitat of the species; Kenyeres & Bauer 2021).



**Fig. 4:** *Isophya costata*, male (Buschberg, Lower Austria, 18.6.2017, M. Denner).

## Discussion

Almost the entire species population of the Weinviertel cliff zone is situated in the area of the Buschberg and thus within the “Leiser Berge” Nature Park. Virtually all meadows with *Isophya costata* occurrences are secured by agri-environmental programmes at least until 2020, as consultation of the nature park management and the managing farmers on site revealed. The two very small populations near Oberleis and on the Michelberg are located on plots that are presumably cut annually, though likely late enough in the year to allow the species’ continued persistence. Given this background, there appears to be no immediate and acute threat scenarios, but the continuation of the extensive meadow management must be guaranteed beyond 2020 under all circumstances. This, however, not only applies to the form of management itself, but specifically also to the cutting date, which must not be before early July (Ivković & Horvat 2020). In addition, only part of the area should be mowed and at least strips should be left.





**Fig. 5:** Habitat of *Isophya costata* on the Buschberg, Lower Austria (18.6.2017, G. Wöss).



**Fig. 6:** Habitat of *Isophya costata* on the Michelberg, Lower Austria (20.6.2017, G. Wöss).

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