

Monitoring breeding birds in the National Park Thayatal: point counts with distance sampling – a case study on selected songbird species

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Abstract

Protecting endangered species and developing management measures requires knowledge about distribution and abundance of species. The national park “Thayatal” shortly after having been established in the year 2000 launched an ornithological startup project to determine the distribution and current numbers of all breeding bird species within its borders. Due to the parks steep slopes and rough terrain lacking tracks in many parts, the first goal was to find a suitable census method serving as a baseline for future monitoring. Because of the difficult terrain that makes locomotion and simultaneous census work impossible we decided to use a point count method (89 points, two visits per breeding season). Lacking any reasonable habitat information at the study’s beginning, points were distributed more or less equally over the whole national park’s area (with slight regard to access points). In order to obtain abundance data, distance sampling was applied. In the field, for any bird record a distance-to-observer was measured (Bushnell laser rangefinder) or estimated after a two day preparatory training and calibrating with the laser rangefinder. Census work was done by only four different, experienced ornithologists during spring and early summer of the year 2000 and 2008 for first monitoring, respectively. Abundance analysis was calculated with DISTANCE software, grouping of data and selection of the best fitting distribution model was done for each species, choosing the variant with the lowest AIC. We demonstrate the results of two selected songbird species (Wood Warbler *Phylloscopus sibilatrix* and Collared Flycatcher *Ficedula albicollis*) with emphasis of this rarely used method in continental Europe and show monitoring results for this species.

Keywords

National Park Thayatal, breeding birds, point count, distance sampling, *Ficedula albicollis*, *Phylloscopus sibilatrix*

Introduction

The National Park “Thayatal” shortly after having been established in the year 2000 launched an ornithological startup project to determine the distribution and current numbers of all breeding bird species within its borders. Due to the parks steep slopes and rough terrain in a closed forest lacking tracks in many parts, the first goal was to find a suitable census method in order to determine breeding densities of all widespread bird species. Furthermore, the study should serve as a baseline for a future monitoring. The chosen method fulfilling all these preliminaries was a point count with distance sampling.

References to guiding theme and to protected areas

The study demonstrates the importance of the protected area for both widespread and rare songbird species alike. Furthermore it illustrates the implementation of a baseline breeding bird survey in a rough terrain lacking habitat quality information at the beginning.

Methods

The study site covered the National Park Thayatal in Lower Austria with a total area of 1330 ha. It’s situated in the north-eastern part of the Waldviertel, a part of the Bohemian Massif. The region is characterized by a Proterozoic plateau (ROETZEL 2010) with rolling hills covered with large forests and interspersed fields and meadows. It is shaped by deep incisions of a few running waters like the river Thaya. The slopes from the plateau to the river and smaller running waters are quite steep and very few tracks or paths break through this barrier in the National Park. For about four decades the area was in the proximate vicinity of the Iron Curtain at the Austrian-Czech border and therefore forestry and agriculture were quite extensive, with an almost complete lack of tourism.

Because of the difficult terrain that makes locomotion and simultaneous census work impossible we decided to use a point count method following BIBBY et al. (1995) and SÜDBECK et al. (2005). Lacking any reasonable habitat information at the beginning, 89 counting points were distributed more or less equally over the whole national park’s area (with slight regard to access points). Point-distribution was made in advance in a Geographic Information System, where coordinates were generated and exported in a GPS-handheld device. In the field, each location was marked with a biodegradable tape. To cover the prolonged breeding season in a temperate forest adequately, each point was visited twice (first to second decade of April and second May-decade to first June-decade, respectively). In order to obtain abundance data, distance sampling was applied: in the field, for any bird

record a distance-to-observer was measured (laser rangefinder) or estimated after a two day preparatory training and calibrating with the laser rangefinder. Simultaneous registrations were marked separately in order to determine maximum registrations for each species and counting point. To keep data variability low, census work was done by only four different, experienced ornithologists during spring and early summer of the year 2000 and 2008 for first monitoring, respectively. Analysis was conducted with species' maxima at every counting point. Abundance analysis was calculated with DISTANCE software (THOMAS et al. 1998) if more than 45 registrations were gained, grouping of data and selection of the best fitting distribution model was done for each species empirically, choosing the variant with the lowest AIC (Akaike Information Criterion) and the lowest coefficient of variation (cv). If both values showed diverging developments in the final choosing section, the model with the lower cv was taken.

Two songbird species were chosen for this presentation: the Wood Warbler (*Phylloscopus sibilatrix*) and the Collared Flycatcher (*Ficedula albicollis*). The Wood Warbler is a widespread and not rare ground breeding species in many parts of Austria but shows a negative population trend in Europe (Species of European Conservation Concern, BirdLife International 2004). The cavity-nesting Collared Flycatcher prefers lower elevations in warm-summer climate outside the Alpine region in Austria and is listed in the Annex I of the European Birds Directive (Official Journal of the European Union 2009). Both species are long-distance migrants that arrive rather late in the season on their breeding grounds in central Europe.

Results

In the year 2000 the Wood Warbler showed to be under the breeding birds with highest abundances all over the study area. The abundance calculated with DISTANCE was $7,1 \pm 1,2$ terr./10 ha. In 2008 the Wood Warbler showed an almost unchanged breeding density of $6,7 \pm 0,5$ terr./10 ha. In total, 164 registrations were used for the analysis, the best fitting model (uniform, cosine) had an AIC of 466,85. In spite of a population loss of about 50% in Austria since 1998 (TEUFELBAUER 2010), the species remained more or less stable in the National Park Thayatal.

In the year 2000, the Collared Flycatcher was found in low numbers, widely distributed over the total area. Therefore, a calculation of its abundance using distance sampling was not possible. On many sample points the species wasn't found at all. Instead of which we followed an approach for a total count mapping all territorial males between the sample points or during other census methods in special habitats (transect count along the permanent open running waters, territory mapping on larger clearings of steppe vegetation in hilly area and meadows along the Thaya river). The total breeding density following this combination of data gathering was 0,6-0,7 terr./10 ha. In 2008 the Collared Flycatcher had shown a significant increase in distribution and abundance. In total, 106 registrations were used for the analysis, the best fitting model (negative exponential, polynomial) had an AIC of 258,62. The species reached an abundance of $3,2 \pm 0,5$ terr./10 ha (300-400 breeding pairs) which is one of the most important single spots for this species in Austria. Direct counts alone made up for 280 territories. Since 1998 the species had increased by 200% in Austria, which shows directly in our monitoring results.

Discussion

The results demonstrate the importance of the protected area for both widespread and rare bird species alike. Rising numbers of the Collared Flycatcher reflect at least partly a large scale increase of this species in the last 10 years after an European decline with lowest numbers in the year 2000 (http://www.ebcc.info/index.php?ID=391&result_set=Publish2010-06&one_species=13480). But facing an intensification of forestry due to rising needs for resources it's still more important to preserve unmanaged woods with large amounts of dead and dying trees with numerous tree holes as nest cavities. Quite different is the case of the Wood Warbler, a formerly widespread and numerous breeding bird in Austria. Results of the Austrian breeding birds' monitoring (TEUFELBAUER 2011) show a long-term and marked decline of the species as for other *Phylloscopus* Warblers in the whole country. The more surprising is the constantly high level of breeding abundance of this species in the Nationalpark Thayatal, underlining the importance of large undisturbed woods not only for Non-Passerines but even for small ground-breeding songbirds.

Conclusion

In the future, more detailed habitat information could be gained and used for habitat modeling for most of the breeding birds in the National Park. Recent studies in other protected areas in the Austrian Alps show, that recording of bird-specific habitat features improves habitat model quality (cf. OBERWALDER et al. 2012, FRÜHAUF et al. 2013).

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