

Ornis Hungarica 12-13: 191-196. 2003

Monitoring Aquatic Warbler *Acrocephalus paludicola* in Poland

J. Krogulec and J. Kloskowski

Krogulec, J. and Kloskowski, J. 2003. Monitoring Aquatic Warbler *Acrocephalus paludicola* in Poland. – Ornis Hung. 12-13: 191-196.



As a globally threatened species, the Aquatic Warbler requires a monitoring programme for population trends to be tracked. Such a programme should consider the timing of censuses to achieve precise assessments of the number of the singing males within the limited singing period. We compare results of whole-population counts conducted in the southern Biebrza basin between 1995 and 1997 and in the Lublin area between 1993 and 1997. Densities of singing males showed different trends for selected fen mire patches within the same wetland complexes. Based on the results of the nationwide census in Poland (1997), we compare data collected during two breeding season counts (between 20 May-6 June and 17 June-3 July respectively) relevant to the timing of the first and second breeding attempts. On most census plots we recorded significantly higher numbers of singing males during the second count than in the first count. Increases in the numbers of singing males were recorded mainly in areas burnt or flooded in spring. In earlier surveys, such places often had been considered 'inappropriate' for the Aquatic Warbler. We discuss some hypotheses concerning changes in the numbers of singing males between the first and second brood surveys. Extending the time of the second count until late June may be important in planning future conservation actions. Also, habitat features during second breeding attempts should be taken into account in the management of the breeding areas.

J. Krogulec and J. Kloskowski, Dept. of Nature Conservation, Curie-Skłodowska University, 19 Akademicka Str., PL-20-033 Lublin, Poland. E-mail: zopumcs@biotop.umcs.lublin.pl

1. Introduction

The Aquatic Warbler is a bird species threatened on a global scale (Tucker & Heath 1994), and Poland holds a considerable proportion of its population (Aquatic Warbler Conservation Team 1999). Consequently, protection of this species in Poland is of prime importance for its existence as a whole. The first estimate of the population status, distribution and abundance of the Aquatic Warbler in selected territories it occupies in Poland was prepared by Dyrz & Czeraszewicz (1993). However, this estimate was based on

extrapolations of counts from transects in larger areas and it omitted the major Aquatic Warbler breeding site, the Biebrza marshes. Complete censuses of whole populations were performed in the Lublin area (calcareous Chelm marshes and Poleski National Park) in 1993 and in the southern Biebrza basin in 1995. In 1997, the first single-year countrywide survey was undertaken, except for the southern Biebrza basin, where only some selected sub-areas were counted (see Aquatic Warbler Conservation Team [1999] for details). During the latter census covering all the important breeding areas, two counts were conducted at a minimum

Tab. 1. Population estimates and major habitat type within the main Aquatic Warbler breeding areas in Poland.

Site	Population estimate	Major habitat type
Western Pomerania	230	Seasonally-flooded brackish marshes, reedbeds
Biebrza and Narew marshes	2040-2080	Rich floodplain marshes in river valleys, open sedge fen mires and wet marshy grasslands covered by high grass and clumps of sedge
Lublin Province marshes	450	Calcareous marshes with <i>Cladium mariscus</i>
Other sites	180 – 190	Small remnants of marshes overgrown by reeds, reedbeds
Total	2900 – 2950	

interval of 2 weeks, to parallel the timing of the first and second broods. In this paper we compare the results of the counts between years and between the first and second brood counts.

2. Study area and methods

In all years, the censuses were carried out during the peak period of male activity between 15 May and 30 June. All complete censuses (those covering all apparently suitable habitats in each geographical area) were performed in the same way. The surveyed sites were divided into sub-areas of c100-300ha, which could be counted within 2 hours around sunset by a group of 4-5 observers. Natural boundaries, like ditches or forest patches, demarcated the sub-areas. During the counts, the participants were arranged in an extended line within sight of one another (50-100m separation). Each observer recorded the singing males found on the stripe between himself and one of his neighbours. For each censused sub-area, data were gathered on land use (mowing, grazing) and recent floods and grass burnings (for more details see Kloskowski & Krogulec 1999).

Most sub-areas were surveyed twice at intervals of at least 2 weeks during the 1997 countrywide census in western

Pomerania, the southern and central Biebrza basin and in the Lublin area (calcareous marshes near Chelm and fen mires in the Poleski National Park). Subsequently, for each geographical area we compared the results from the first and second visits. Only counts conducted between 20 May and 6 June for the first broods and 17 June and 3 July for second broods were included in the analyses, except for some from areas in Western Pomerania, where the counts were relatively late, the first having been delayed until 13 June.

3. Results

Overall in 1997, in the first count made which we consider to be the basic count for estimating the number of singing male Aquatic Warbler in Poland, 1307-1341 singing males were counted. During the survey of the Aquatic Warbler in 1995 in the Biebrza southern Basin, the 1578-1609 males were detected. Upon adding these two numbers, the population of the entire country may be estimated at 2885-2950 males. Acceptable round figures for Poland are 2900-3000 singing males. Detailed data on population estimate and major habitat types within the main Aquatic Warbler breeding areas in Poland are given in Tab. 1.

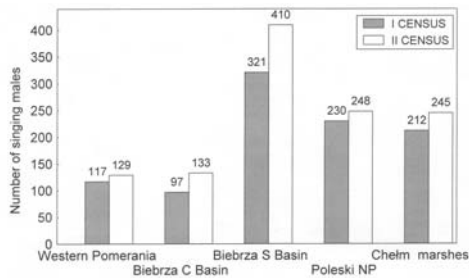


Fig 1. Numbers of singing males during the first and second censuses in the most important Aquatic Warbler breeding areas in Poland, 1997.

Comparison of first and second censuses

In all the important breeding areas of the Aquatic Warbler in Poland where double counts were conducted systematically (in over 50% of the monitored areas), the numbers of singing males increased between the first and second census (Wilcoxon signed-ranks test, $T_{10}=0$, $n=5$, $P=0.043$; Fig. 1). However, trends in numbers of singing males varied between the sub-areas delineated for census purposes within the same complexes of marshlands.

Although our data on habitat quality were not sufficient for quantitative assessment, in some areas the increase in the number of singing males during the second censuses was clearly associated with habitat improvement in the course of the breeding season. These habitat improvements usually comprised areas burned or flooded in the spring of that year where the vegetation had not regenerated before the second broods had been started. Elsewhere, in a few plots adjacent to human settlements, grazing by domestic cattle could have thinned out the dense layer of lower vegetation.

4. Discussion

4.1. Differences between first and second censuses

On the basis of the previous research (Dyrzc & Zdunek 1993) it has been assumed that the density of breeding males is at its highest during the first breeding attempts (the second half of May and the first week of June) and then gradually decreases. However, during the 1997 countrywide census, numbers of singing males were higher during the second counts than during the first counts in all the important breeding areas. This pattern could have at least four different explanations, which are not exclusive:

1. The differences result from exchanges between nearby subpopulations (Schaefer *et al.* 2000) and the overall increase in numbers is an artifact of these changes in density in particular areas. Similar high numbers were observed during the 1998 July counts in some plots in Sporova and in the Zvanets mires in Belarus. Here the reasons for the apparent movements of the birds between the plots were spring burning of vegetation and summer floods caused by abundant precipitation (Kozulin & Flade 1999). However, the overall increase in numbers in Poland was consistent in all studied areas and we believe that it is unlikely that any important breeding areas of Aquatic Warbler that might have been a source of the males' influx have been left undetected in Poland.
2. Breeding Aquatic Warblers settle initially in a more dispersed manner, occupying marginal habitats dispersed

around the 'core' areas. Some marginal habitats might have been occupied unrecorded, having been assessed as 'unsuitable'. Later in the season, when the birds are more aware of breeding conditions (and there is availability of receptive females), the males cluster in the most optimal areas. Small numbers of singing males were recorded in some isolated areas that may previously have constituted important breeding habitats, but have suffered a significant degradation, e.g. the Ner river mouth (Aquatic Warbler Conservation Team 1999).

3. The number of singing males during second broods in marshlands of Poland increases because males from breeding areas east of the Polish border (in Belarus and Ukraine) leave these grounds and gather in Poland, where they attempt to mate.
4. The timing of the spring arrival at the breeding grounds is widely spread between males (see also Persson & Öhrström 1989), some of them arriving too late to compete for females undertaking the first brood. Alternatively (in the case of young males) intensified advertising for females occurs later in the season because they need time to attain post-migration recovery. This may be important, because females seem to return from their wintering quarters not much later than males (Dyrzcz & Zdunek 1993).

It must be noted that for logistical reasons the dates of our counts were spread over more than two weeks each and did not match perfectly the peaks of laying the first eggs of the first and second clutches, 15-29 May and 21 June-5 July respectively (Dyrzcz & Zdunek 1993). However, of

particular note is that the initiation of second clutches appears to be poorly synchronized and may differ between breeding areas within the country and between years.

The ultimate verification of the above hypotheses will be difficult, despite thorough ecological and behavioural research in recent years. Some basic information on the breeding biology of Aquatic Warbler, such as breeding sex ratio, site fidelity, inter- and intra-sexual differences in the timing of arrival on the breeding grounds, is lacking, mainly due to the breeding birds of both sexes being highly mobile and absence of territoriality in the males (Schaefer *et al.* 2000). Although males seem to track fertile females (Schaefer *et al.* 2000), we do not know whether the increase in abundance of singing males during second broods reflects an increase in the number of females attempting second clutches. As far as we know at present, only c50% of females start second broods (Schulze-Hagen *et al.* 1999), but this figure may be inaccurate, because most females starting a second clutch move to another area (Wawrzyniak & Sohns 1977, Dyrzcz & Zdunek 1993). Still, the concentration of breeding attempts late in the season may be offset by a seasonal decline in offspring quality (Nilsson & Smith 1988, Verhulst & Tinbergen 1991) and in reduced survival prospects of double-brooded females (Bryant 1979, Verhulst & Tinbergen 1991).

4.2. Proposals for, and character of, monitoring work

Further intensive monitoring should be conducted of a few selected areas, comprising repetition of the counts throughout the

breeding season at regular one-week intervals to detect possible settlement changes in the area. Descriptions, made in parallel with each count, of selected habitat characteristics such as water depth, the vegetation cover would make it possible to define the range of a optimum habitats over the timescale of the whole breeding period.

We propose a long-term monitoring programme of Aquatic Warbler in Poland, censuses being carried out on selected representative plots, within all the present breeding sites. Simultaneous checks (of seasonal changes of plant cover), measurements (of parameters such as plant height; water level, density and structure of plant cover) and descriptions (of characteristic plant species) would make it possible to adapt factors of conservation activity (controlled grazing, controlled mowing, prescribed burning) to changes in the structure of the plant cover. Such monitoring should comprise both optimal and sub-optimal habitats.

Censuses should be made:

1. Every three years on the same plots chosen within all the breeding sites of Aquatic Warbler in Poland
2. Every year on one selected monitoring plot each at the most important breeding sites: western Pomerania, the Biebrza marshes, the Narew marshes and the Lublin Province marshes.

There should be two censuses each season, to coincide with the first and second brood periods of 15-30 May and 15-30 June.

4.3. Conclusions

1. Considering that all the main breeding areas of Aquatic Warbler in Poland appear to be identified and that the

habitat requirements of the species are well defined, monitoring of Aquatic Warbler should comprise monitoring of changes in habitat characteristics in the most important areas. Clustered distribution of Aquatic Warblers in the occupied areas, intra-seasonal changes in numbers and locally-specific causes of habitat destruction may lead to inaccurate predictions of population trends, unless based on habitat quality assessment. Vegetation sampling should be designed to document the range of 'suitable areas'.

2. Monitoring should comprise not only optimal breeding habitats but also sub-optimal breeding habitats with low numbers of singing males. Because a proportion of the sub-optimal habitats are small and are dispersed throughout the country, it will be necessary to mobilise local resources for counts and conservation action.
3. In the monitored areas, double counts should be conducted, although in practice this restricts the number of census plots. During second broods, second counts may help to pinpoint the role of some areas, by detecting during the breeding season differential habitat attractiveness and links between fluctuations in habitat features and distribution of birds.
4. Research is needed on the links and relations between subpopulations of the entire meta-population.

Acknowledgements. We thank Martin's Aquatic Warbler Conservation Team for useful comments on the manuscript and Peter Kenny for fine-tuning the English.

References

- Aquatic Warbler Conservation Team. 1999. World population, trends and threat status of the Aquatic Warbler *Acrocephalus paludicola*. – Vogelwelt 120: 65-87.
- Bryant, D.M. 1979. Reproductive costs in the House Martin (*Delichon urbica*). – J. Anim. Ecol. 48: 655-675.
- Dyrcz, A. & R. Czeraszewicz. 1993. Liczebność, zagrożenia i sposoby ochrony populacji lęgowej wodniczki (*Acrocephalus paludicola*) w Polsce. – Not. Ornith. 34: 231-246.
- Dyrcz, A. & W. Zdunek. 1993. Breeding ecology of the Aquatic Warbler *Acrocephalus paludicola* on the Biebrza marshes, northeast Poland. – Ibis 135: 181-189.
- Kloskowski, J. & J. Krogulec. 1999. Habitat selection by Aquatic Warbler *Acrocephalus paludicola* in Poland: consequences for conservation of the breeding areas. – Vogelwelt 120: 113-120.
- Kozulin, A. V. & M. Flade. 1999. Breeding habitat, abundance and conservation status of the Aquatic Warbler *Acrocephalus paludicola* in Belarus. – Vogelwelt 120: 97-111.
- Nilsson, J.-A. & H. G. Smith. 1988. Effects of dispersal date on winter flock establishment and social dominance in Marsh Tits *Parus palustris*. – J. Anim. Ecol. 57: 917-928.
- Persson, O. & P. Öhrström. 1989. A new avian mating system: ambisexual polygamy in the Penduline Tit. – Ornis Scand. 20: 105-111.
- Schaefer, H. M., Naef-Daenzer, B., Leisler, B., Schmidt, V., Müller, J. K. & K. Schulze-Hagen. 2000. Spatial behaviour in the Aquatic Warbler (*Acrocephalus paludicola*) during mating and breeding. – J. Orn. 14: 418-424.
- Tucker, G. M. & M. F. Heath. 1994. Birds in Europe: their conservation status. BirdLife International (BirdLife Conservation Series No 3). BirdLife International, Cambridge, U.K.
- Wawrzyniak, H. & G. Sohns. 1977. Der Seggenrohrsänger. – A. Ziemsen, Wittenberg-Lutherstadt, Germany.
- Verhulst, S. & J. M. Tinbergen. 1991. Experimental evidence for a causal relationship between timing and success of reproduction in the great tit *Parus m. major*. – J. Anim. Ecol. 60: 269-282.