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Author: Polak, Marcin

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Temporal pattern of vocal activity of the Water Rail *Rallus aquaticus* and the Little Crake *Porzana parva* in the breeding season

Marcin POLAK

Department of Nature Conservation, Institute of Biology, Maria Curie-Skłodowska University, Akademicka 19, 20–033 Lublin, POLAND, email: mpolak@hektor.umcs.lublin.pl

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Abstract. In the Water Rail the patterns of the two main types of vocalization were quite different: the announcement call was uttered throughout the breeding season with two peaks, one in April and the other in early June, but the courtship call occurred only in the pre-laying period. The vocalization period of the Little Crake is short but intensive, peaking before the start of incubation. In general, Water Rails produced more vocalizations in the evening than in the morning. The vocal activity of the Little Crake peaked at dawn. In both species a peak in vocal output occurred shortly before sunrise and before sunset.

Key words: Water Rail, *Rallus aquaticus*, Little Crake, *Porzana parva*, vocal activity

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INTRODUCTION

The Water Rail and the Little Crake are species inhabiting emergent vegetation in wetlands, flooded valleys and waterbodies such as lakes, ponds and ditches (Cramp & Simmons 1980, Hagemeijer & Blair 1997, Taylor & van Perlo 1998). Both species are poorly studied, because they are secretive and their habitat is difficult to penetrate (but see Flegg & Glue 1973, Musil 1993, Jenkins et al. 1995, Andreas 1996, Frädrich 1998, Jenkins 1999, Jenkins & Ormerod 2002, De Kroon 2004). Water Rail and Little Crake have a repertoire of different types of vocalization (Cramp & Simmons 1980, De Kroon 1982). The characteristic feature of these species is vocal duets between the mated pairs (although this is not yet sufficiently documented, see Stiefel & Berg 1975, Cramp & Simmons 1980). In species living in dense vegetation, such as many Rallidae, calling activity is probably crucial for long distance communication (e.g. Osiejuk & Olech 2004).

In this study the seasonal and diurnal patterns of vocal output were analysed and the functions of main vocalizations of the two species were discussed. Among songbirds, the song of male may have many functions which can be grouped in two categories: 1) intra-sexual (defending a territory, deterring other males and thereby mate guarding) 2) inter-sexual (attracting and stimulating the endocrine system of a mate, attracting other females for extra pair copulations, mate guarding) (see review in Catchpole & Slater 1995). Although most of the avian vocalizations studies have been carried out on songbirds, calls of many non-passerine species can be considered in the same context (Martin-Vivaldi et al. 1999). The changes in vocal output over the breeding period can be used to assess which of the functions prevail in a species. If vocal activity continues throughout incubation and the parental care period, then it is used mainly in territorial defence. However, if vocalizations occur only in the prelaying stage and then stop, they probably have inter-sexual functions (Lampe & Espmark 1987, Merila & Sorjonen 1994, Slagsvold 1996).

MATERIALS AND METHODS

The study was carried out from mid-March to mid-July 2004 in 185 ha Samoklęski fishponds

complex (51°08′–27′N 22°23–54′E, Lublin region) in eastern Poland. Observations were made from a single point on a dam at "Dąb" pond (9 ha, ca. 150 × 600 m). Nearly 42% of this pond was covered by Reed Beds *Phragmites australis* with smaller patches of Reed Mace *Typha angustifolia* in the deeper water. The spontaneous vocal activity was recorded and noticed on paper from a distance of 10–80 m. The research was carried out without playback. During the period of field work, 16 (8 dawn and 8 dusk) the listening sessions were carried out with 2 weeks interval. The dates of sessions were as follows: 29 March, 13–14 April, 29–30 April, 11–12 May, 28–29 May, 11–12 June, 29–30 June, 10–11 July. The sampling methods were similar to the general procedure applied in a French study of temporal pattern of booming in Bitterns *Botaurus stellaris* (see Material and Methods in Poulin & Lefebvre 2003). During each visit all call-locations were plotted on a plan of pond. Special attention was paid to the records of simultaneously active birds. On the basis of territory location and the maximum number of individuals active simultaneously it was estimated that on pond "Dąb", there were 4 nesting pairs of Water Rails and 3 pairs of Little Crakes.

Following Hasselquist et al. (1993), Slagsvold (1996) and Welling et al. (1997), in this study, vocalization rate is presented as the per cent of time the individuals spent calling. Vocal activity was sampled in blocks of 180 minutes, one starting 2 h before and finishing 1 h after sunrise and sunset. Calling activity was expressed as the percentage of minutes of the total time of observation in which at least a single bird from all studied individuals of the species in the study area was heard vocalizing (one or more times). Dense vegetation and occasional duetting by specimens of a pair in both species prevented the measurement of individual call rate. Sampling took place in stable weather without strong winds or rainfall.

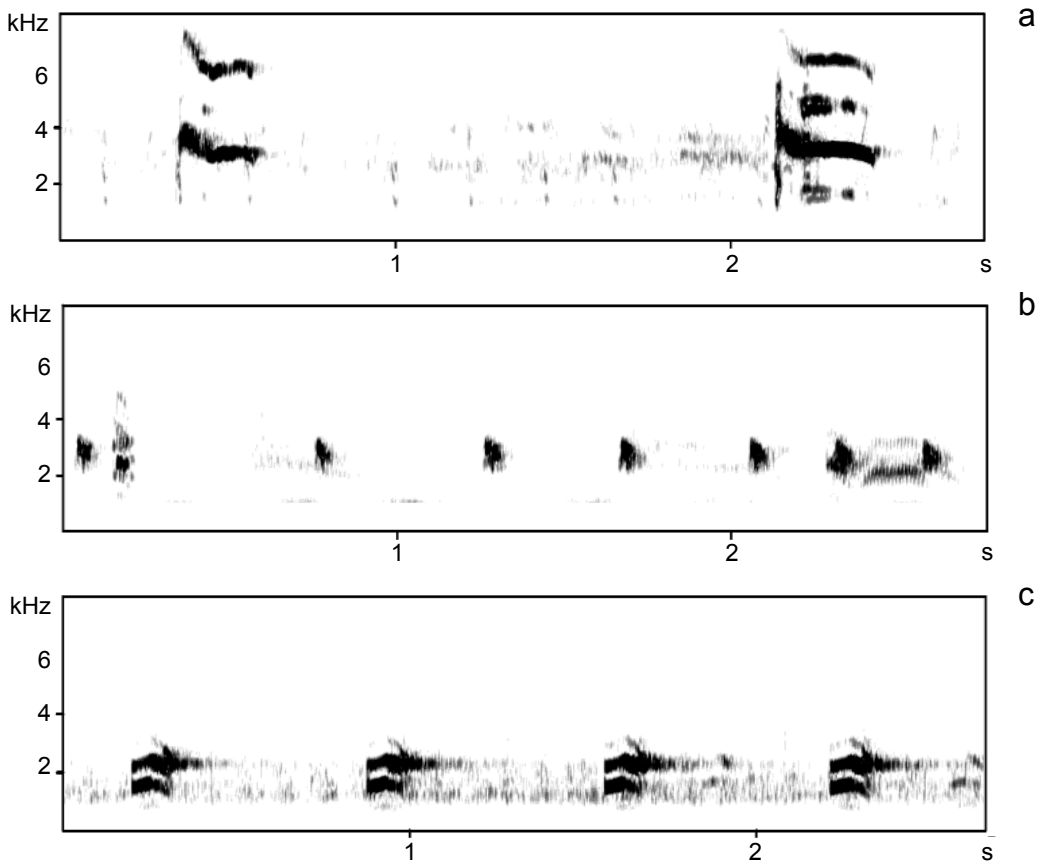

Fig. 1. Sonograms of a Water Rail and a Little Crake main vocalizations. a — the announcement call of Water Rail, b — the courtship call of Water Rail, c — the advertising call of Little Crake. All sonograms prepared in Avisoft SAS-Lab 4.36 with following setting: FFT-Length = 1024, Frame [%] = 25, Window = Hamming and Overlap [%], which gave 224 Hz bandwidth and 43 Hz 2.90 ms resolution.

In the Water Rail two types of vocalization were recorded: 1) the announcement call — a series of trilling whistles and screeches with variation in power, tonal quality and duration (Fig. 1a). It was the main vocalization of adult birds; and 2) the courtship vocalization (Fig. 1b) — a melodic and repetitive call, rendered "tyick, tyick ..., tyüirr" (Cramp & Simmons 1980). In the Little Crake only one type of vocalization produced by both of sexes was recorded: advertising call (Fig. 1c) – an accelerating series of repeated calls at intervals of 1–4, rendered "quack-quack-quack ..." (Cramp & Simmons 1980).

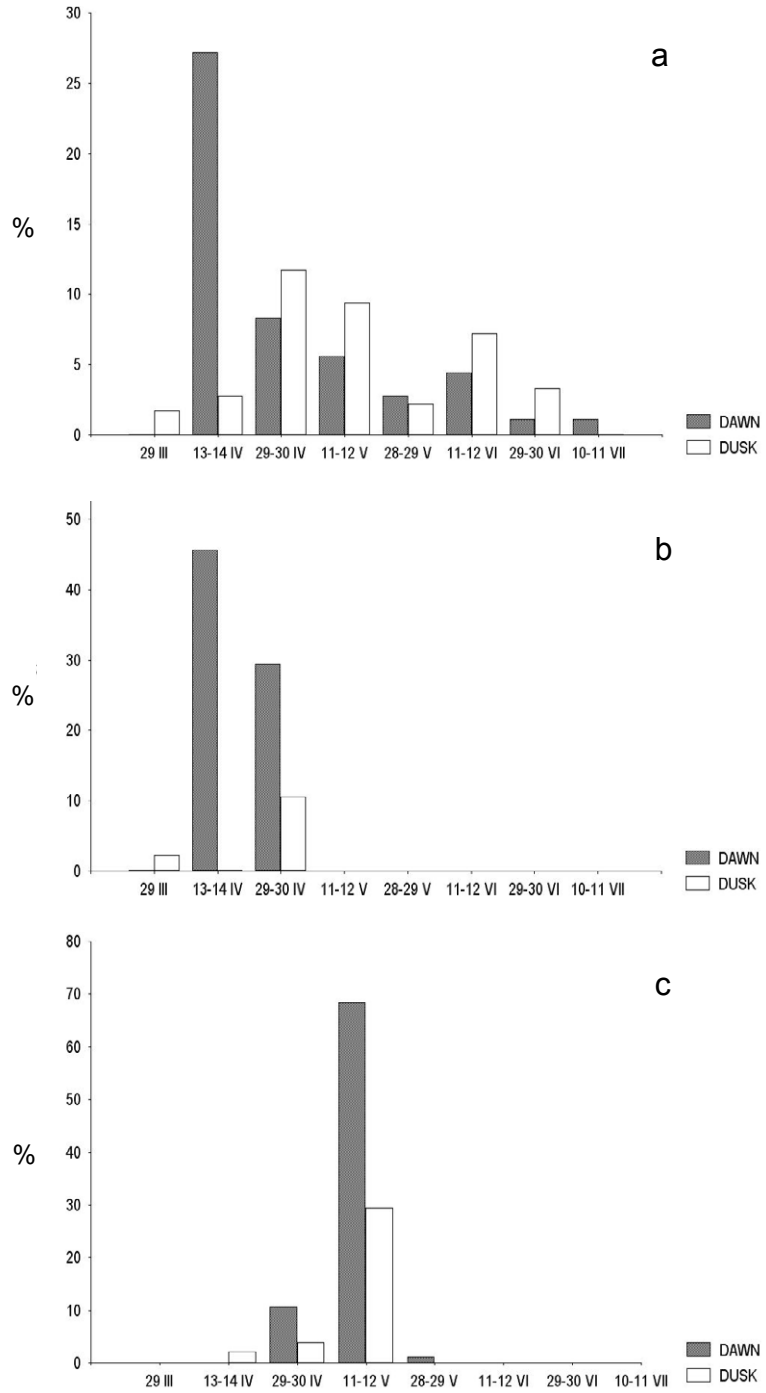

Fig. 2. The vocal activity of four pairs Water Rails and three pairs Little Crakes during the breeding season of 2004 at Samoklęski fishponds. a — the announcement call of Water Rail, b — the courtship call of Water Rail, c — the advertising call of Little Crake.

RESULTS AND DISCUSSION

Water Rails produced announcement calls throughout the study period (Fig. 2a). However, there were differences in the dawn vocal activity between the subsequent half-month periods. Vocal production was highest directly after arrival in early April and then declined with small peak in first half of June. The dusk vocal output also varied significantly over time, with two clear peaks in late April and early June. Courtship vocalization was uttered only at the beginning of the breeding season from mid-March to the end of April (Fig. 2b).

Little Crakes had a short and intensive vocalization period from April to May (Fig. 2c) and the vocal activity was principally concentrated in the first half of May

Generally Water Rails were more active in the evening than in the morning, except the first half of April and late May (Fig. 2a). Measuring the calling activity in 30-min periods demonstrated that the vocalization was highest one hour before sunrise and then decreased rapidly, at dusk there was a progressive increase in activity, with a culminating peak about 30 min before sunset (Fig. 3a).

Little Crakes sang more actively at dawn than dusk. Shortly (30 min.) before sunrise, the vocal

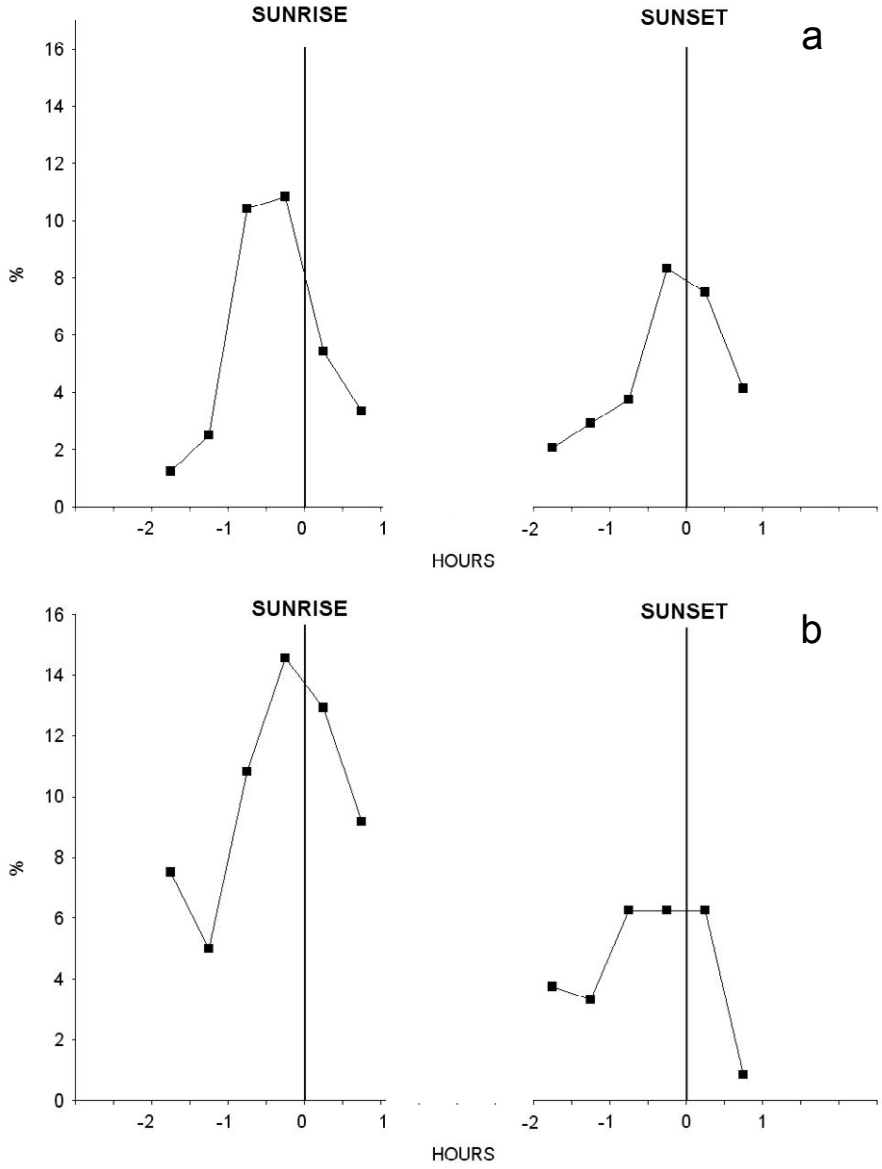

Fig. 3. Dawn and dusk pattern of vocal activity in the breeding season of 2004 calculated for consecutive 30-min periods. a — Water Rail (the announcement call), b — Little Crake (the advertising call).

activity was the highest and then it dropped markkedly (Fig. 3b). At dusk the pattern was similar and a peak occurred in a period around sunset.

Both the sexes in the Water Rail are reported to be vocally active throughout the year, but call most frequently during territory establishment and breeding season (Cramp & Simmons 1980). This study shows that announcement calls were produced throughout the study period with two peaks of the vocal activity. The first peak of calling activity occurred in the pre-laying period. Incubation starts in Poland in late April (Dombrowski et al. 1993, Dyrcz et al. 1991). In early June, there was the second, smaller peak that may be related to the start second broods (Flegg & Glue 1973, Jenkins 1999). This pattern of activity indicates an inter-sexual function as well as the defence of territories and nest sites, as shown by the response of both the sexes to playback of the call at Siedlce fishponds in Poland; a response that tended to increase as the breeding season progressed (Dombrowski et al. 1993). A similar situation was reported for the Corncrake *Crex crex* population from Kampinoski National Park (Osiejuk et al. 2004). In this study, courtship calls were only uttered in the pre-laying phase and they decreased drastically during the breeding season, suggesting a function related to pair formation. However, this call type may have many other functions: enhancing pair bonds or advertising (Cramp & Simmons 1980). A different seasonal pattern of courtship vocalization was found in a population of Water Rails on the Waddensea island Vlieland (De Kroon 1983). There were two periods of call activity: from the beginning April to mid-May and from early June to the beginning July.

Little Crakes vocalized in the pre-laying period (in Poland the initiation of egg laying is in late May, Dyrcz et al. 1991), calling intensively after arrival and becoming silent at the start of incubation. This may suggest a mainly inter-sexual function of the advertising call.

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STRESZCZENIE

[Zmiany aktywności głosowej wodnika i zielonki w sezonie lęgowym]

Celem pracy było określenie funkcji głównych typów głosu wodnika i zielonki przez zmierzenie częstości wokalizacji w trakcie okresu lęgowego. Badania wykonano na 185 ha kompleksie stawów rybnych w Samoklęskach (woj. lubelskie) od marca do lipca 2004 roku w odstępach dwutygodniowych. Sesje przeprowadzono w następujących terminach: 29 marzec, 13–14 oraz 29–30 kwiecień, 11–12 oraz 28–29 maj, 11–12 oraz 29–30 czerwiec, 10–11 lipiec. Nasłuchy wykonano z jednego punktu zlokalizowanego na grobli przy stawie "Dąb" (9 ha, 42% pokrycia przez szuwar trzcinowy i pałkowy), gdzie gniazdowały 4 pary wodnika i 3 pary zielonki. Aktywność głosowa badanych par obu gatunków była mierzona w trakcie 8 porannych i 8 wieczornych 180-minutowych sesji, rozpoczynających się 2 godziny przed, i kończących się 1 godzinę po wschodzie i zachodzie Słońca. Badania prowadzono bez stymulacji magnetofonowej. Jako wskaźnik poziomu wokalizacji przyjęto okres czasu, podczas którego przynajmniej jeden osobnik z badanych populacji był aktywny głosowo w trakcie pojedynczej sesji. Rejestrowano główne typy głosów obu gatunków: głos kontaktowy (ang. announcement call, Fig. 1a) i godowy wodnika (ang. courtship vocalization, Fig. 1b) oraz głos godowy zielonki (ang. advertising call, Fig.1c).

Wodniki wydawały głosy kontaktowe przez cały okres badań z dwoma szczytami: w pierwszych połowach kwietnia i czerwca (Fig. 2a). Drugi, mniejszy szczyt najprawdopodobniej związany był z rozpoczęciem drugich lęgów (Flegg & Glue 1973, Jenkins 1999). Schemat ten sugeruje, że ten rodzaj głosu wodnika, oprócz funkcji terytorialnych (skierowanych do przedstawicieli własnej płci), ma również znaczenie w komunikacji pomiędzy samcami a samicami. Natomiast drugi analizowany typ wokalizacji tego gatunku (głos godowy) stwierdzono jedynie na początku sezonu lęgowego, w okresie formowania się par (Fig. 2b). Zielonki miały krótki i intensywny okres aktywności głosowej, trwający od kwietnia do maja, w okresie przedlęgowym (Fig. 2c). Głos godowy zielonki prawdopodobnie spełnia głównie funkcje związane z wyborem partnera. U obu gatunków zaobserwowano wyraźny szczyt poziomu wokalizacji przed wschodem i zachodem Słońca (Fig. 3).