SHORT COMMUNICATIONS

NEST PREDATOR SPECIES OF OPEN NESTING SONGBIRDS OF ABANDONED FIELDS IN «RUSSKY SEVER» NATIONAL PARK (RUSSIA)

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The study was conducted in the southern part of the «Russky Sever» National Park during 2016–2017 as a part of the research on the life history and demography of songbirds breeding in abandoned fields. The nest fate was established by using motion-sensing trail cameras. Among 87 controlled nests, 36 were depredated and revealed at least seven predator species. Almost all predators were mainly attracted by nests with nestlings. But not all predation events led to fully depredated nests. Our data suggest that the local populations of ground-nesting passerines in national park «Russky Sever» are under the influence of several groups of nest predators.

Key words: breeding success, ground nesting passerines, nest predation, trail cameras

Introduction

Nest predation is the main cause of reproductive failure for grassland birds (Martin, 1995; Klug et al., 2009; Ibáñez-Álamo et al., 2015). The understanding of the variation in nest predation rates is complicated due to the diverse assemblage of species known to prey on nests. Each predator species (or group of species) has its own specific impact on the breeding success, depending on predator pressure dynamics, predator spatial distribution, nest accessibility, etc. (Benson et al., 2010; Pietz et al., 2012; DeGregorio et al., 2014). Thus, to discover the spatial and temporal variability in avian breeding productivity as a variable of nest predation, we need information on predator identities. Recent photo and video techniques enable studying nest depredation in much more detail and hence, contribute to a more detailed knowledge of avian breeding success (Ibáñez-Álamo et al., 2015). For the first time researchers have received an opportunity to clearly estimate the impact of nest predation on the breeding success, reveal predator species, assess the relative role of each of them (Weidinger, 2008; Pietz et al., 2012; Grendelmeier et al., 2015; Weston et al., 2017).

In 2001–2017, we studied the life history traits of ground nesting passerines breeding in abandoned fields in the «Russky Sever» National Park (Vologda region). The breeding success of focal species was affected by nest predation, with up to 95% of all nests depredated. In 2016–2017, we used trail cameras to identify nest predators of passerines in the «Russky Sever» National Park. Here, we report the results.

Material and Methods

Study site

The study was conducted in the southern part of the «Russky Sever» National Park (Vologda region) near Topornya (59°46′N, 38°22′E) during 2016–2017 as a part of the research on the life history and demography of songbirds breeding in abandoned fields. Our study plot (450 ha) consisted of abandoned (since 2005) fields covered with ruderal vegetation (*Sonchus arvensis* L., *Artemisia vulgaris* L., *Cirsium setosum* (Willd.) Besser ex M. Bieb., *Anthriscus sylvestris* (L.) Hoffm., *Carduus nutans* L., and *Elytrigia repens* (L.) Nevski). Ruderal plant species formed dense clumps surrounded by a similarly dense, but less tall meadow vegetation (*Dactylis glomerata* L., *Phleum pratense* L., *Taraxacum officinale* (L.) Weber ex F. H.Wigg., etc.). The plant cover height was 10–15 cm at the beginning of the breeding season (late May – early June) and reached 50–70 cm at the time of fledging (first half of July). An irrigation ditch overgrown by birch *Betula pendula* (Roth, 1788) and willow trees *Salix sp.* (L., 1753) at the edges was located at the plot periphery and young growth of spruce (*Picea* sp.) and pine (*Pinus* sp.) appeared directly at the study plot.

Study species

Three most numerous passerine species were chosen as focal species: Booted Warbler *Iduna caligata* (Lichtenstein, 1823), Whinchat *Saxicola rubetra* (Linnaeus, 1758) and Yellow Wagtail *Motacilla flava* (Linnaeus, 1758). They had overlapping breeding periods and similar nest predation rates (Shitikov et al., 2012, 2013, 2015).

Data collection

Field work started each year between 15 and 25 May and lasted until 20–21 July. Nests were located by observing the behaviour of the adults. In total, 299 nests of focal species (108 Booted Warbler, 141 Whinchat and 50 Yellow Wagtail) were found. The nest fate was established by using motion-sensing trail cameras (Bushnell Trophy Cam, Scout Guard 570-BW, Scout Guard 562-BW, Welltar D-3). Five cameras were used in 2016 and 15 in 2017. Trail cameras were placed on or slightly above the ground at 40–120 cm from the bird's nest. Scout Guard cameras have a small focus distance (40 cm) and a low power flash light which allowed us to use these cameras close to nests. As the majority of nests were surrounded by a dense vegetation, only photo footage with minimal sensor sensitivity and image size was conducted. Cameras were controlled every three days for battery and SD card replacement. After nest depredation or fledging date, a camera was moved to another active nest. In total, 87 nests of the three focal species were under control (29 – in 2016, 58 – in 2017) with trail cameras work of 667 camera-days and 219 632 images received.

Results and Discussion

Among 87 controlled nests, 36 (41.4%) were depredated. Another 10 nests were partially depredated (a predator ate some eggs or nestlings, but at least one nestling successfully left the nest). Among 212 nests without cameras, 77 (36.3%) were depredated. A frame-by-frame view of photo footage from completely or partially depredated nests revealed at least 7 predator species (Table 1) in 35 cases, in 11 cases a predator was not caught by a trail camera. Most often cameras fixed next depredation by Hooded Crow *Corvus cornix* (Linnaeus, 1758) (Fig. 1) and Common Adder *Vipera berus* (Linnaeus, 1758) (Fig. 2).

In 2017, small mammals, mainly rodents, depredated nests in six cases (Fig. 3) as a rule during the night. Unfortunately, the quality of night footage was low to identify small mammal species. Among accidental predators, Corncrake *Crex crex* (Linnaeus, 1758) was recorded at a nest of the Booted Warbler in 2017 (Fig. 4).

Table 1. List of ground-nesting passerines nest predator species revealed by trail cameras in national park «Russky Sever» in 2016–2017

Species of predator	Number of predation events		
	Saxicola rubetra nests	*Iduna caligata* nests	*Motacilla flava* nests
Common Adder *Vipera berus* (Linnaeus, 1758)	4	5	1
Corncrake *Crex crex* (Linnaeus, 1758)	0	1	0
Hooded Crow *Corvus cornix* (Linnaeus, 1758)	9	1	0
Magpie *Pica pica* (Linnaeus, 1758)	2	0	1
European Hedgehog *Erinaceus europaeus* (Linnaeus, 1758)	4	0	0
Small mammals*	2	4	0
Domestic Dog *Canis familiaris* (Linnaeus, 1758)	0	0	1
A predator was not fixed	3	5	3
Total	24	16	6

*a species was not identified

Fig. 1. Depredation Whinchat's nest by Hooded Crow *Corvus cornix*.

Fig. 2. Depredation Whinchat's nest by Common Adder *Vipera berus*.

Fig. 3. Depredation Booted Warbler's nest by small mammal.

Fig. 4. Depredation Booted Warbler's nest by Corncrake *Crex crex*.

The most identified predators are typical destroyers of open-nesting passerine birds in farmland areas across Europe (Angelstam, 1986; Andren, 1992; Söderström et al., 1998; Evans, 2004), except the Common Adder and Corncrake. The Common Adder is a common predator of passerine nests in the north of European Russia where passerine nestlings form 6% to 100% of the Adder's diet (Belova, 1978; Korosov, 2010).

Among depredated nests, 15 were at incubation stage and 31 were at nestling stage. All predators, excluded small mammals, were mainly attracted by nests with nestlings. The Common Adder and Hedgehog killed nestlings only. Corvids depredated nests usually at the first half of the breeding season, while the predation peak of the Common Adder was in July (Fig. 5).

Probably, corvids could not find nests in tall grass at the end of the breeding season. The adders' activity increases due to the temperature rise at the end of June. This point needs additional investigation.
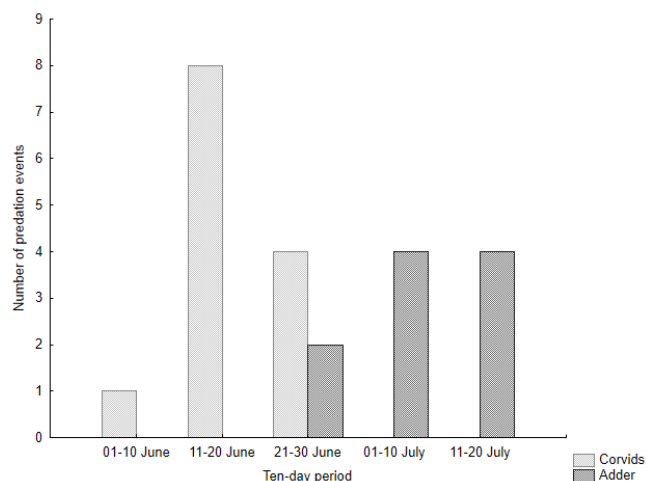
The daily nest survival rates of the Booted Wabler and Yellow Wagtail depend on the nest age (Shitikov et al., 2012, 2013). Daily nest survival rates were high at the beginning of the incubation period and then declined to the minimum values at the beginning of the nestling period. These results could be explained by predators' preference to nests with nestlings.

In some cases (21.7%) predator attacks did not lead to full nest depredation. More often (in seven of ten cases) partial predation was due to the Common Adder. Other predators (corvids, hedgehogs) tended to eat the whole brood, but some of the nestlings had a chance of escaping in the predator's occurrence, only if they were over 9-10 days old. Therefore, the Common Adder could have a much smaller effect on passerine breeding productivity and local apparent survival than corvids despite the same number of nest attacks.

Conclusions

Trail cameras are an effective tool for monitoring reproductive success of ground nesting passerines as they allow clearly identifying both nest predator community and a part of each species in breeding success. Trail cameras could be useful for revealing partial depredation of broods and, as a result, for more accurate estimation of passerine breeding success. Our data suggest that the local populations of ground-nesting passerines in the national park «Russky Sever» are under the influence of several groups of nest predators. Among the identified predators corvids may play the most important role.

Fig. 5. Distribution of predation events during breeding season (2016–2017).

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ВЫЯВЛЕНИЕ ВИДОВОГО СОСТАВА РАЗОРИТЕЛЕЙ ГНЕЗД ВОРОБЬИНЫХ ПТИЦ НА ЗАБРОШЕННЫХ ПОЛЯХ В НАЦИОНАЛЬНОМ ПАРКЕ «РУССКИЙ СЕВЕР» (РОССИЯ)

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Исследование проведено в южной части национального парка «Русский Север» в 2016–2017 гг. как часть работы по изучению жизненных циклов воробьиных птиц на заброшенных полях. Для наблюдения за судьбой гнезд использовались фотоловушки. Среди 87 гнезд, находившихся под контролем, 36 были разорены, что позволило выявить не менее семи видов разорителей. Большинство случаев разорения зафиксировано на стадии выкармливания птенцов. Нападение хищника не всегда приводило к полному уничтожению выводка. Наши данные свидетельствуют о том, что локальные популяции наземно-гнездящихся воробьиных птиц в национальном парке «Русский Север» находятся под влиянием нескольких групп разорителей.

Ключевые слова: гнездовое хищничество, наземно-гнездящиеся воробьиные, успех размножения, фотоловушки