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Brief Communication

Funnel trap as a method for capture migrating bats in Pape, Latvia

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Abstract

We constructed a large funnel trap on the coast of the Baltic Sea on dunes of Pape village, Latvia. The trap has been used during the peak autumn migration of bats in Latvia in August and September. During the period of 2014 – 2020, about 40 thousand bats were captured in the trap, mostly Nathusius' Pipistrelle *Pipistrellus nathusii*, about 35 thousand individuals. In migration hotspots of bats, this is suggested method of trapping since large number of bats might be trapped without entangling bats in mist-nets.

Key words: bat migration, funnel Heligoland trap, *Pipistrellus nathusii*.

Introduction

Research on bird and bat migration usually includes also capture of animals. A problem with bird captures with mist nets often arises when there are several hundred birds entangled in one mist-net and the capacity of ringers is limited. Bats during migration are usually scarce and there are too few captured due to lower concentrations of bats and higher migration altitude (mist nets are usually limited to 2 m above the ground). A funnel trap for bird research was first built on Heligoland Island, Germany in 1920 by Dr. Hugo Weigold (Weigold 1922; Weigold 1924; Weigold 1956; Woodford, Hussel 1961) and therefore later funnel traps for bird trapping have often been referred as "Heligoland traps". However, funnel traps were constructed previously for trapping thrushes (*Turdus* spp.) for food (Gatke 1895). In 1957 in Rybatschi Ornithological station (former Vogelwarte Rossitten of Germany) on the Curonian Spit, a large Heligoland trap was designed and built by Jānis Jakšis and team of the station (Belopolskii 1961). This large Heligoland trap is also referred to as the "Rybatschi trap" (Payevsky 2000).

Survey of the best place for establishing a bird observatory in Latvia for research of autumn migration of birds was done in autumn of 1958 (Mihelsons et al. 1960). The results of a month of observations between September 15 and October 15 indicated two locations with considerable bird concentrations: Salacgrīva and Pape (Fig. 1). The Bird Observatory at the Baltic Sea coast in Pape village was established in 1966 (Blūms et al. 1966; Baumanis 1995) and the first Rybatschi type trap was built in 1968. However, in 1985 it was noticed that also migrating bats could be observed and captured in great numbers in the trap (Celmiņš et al. 1986). Harp traps for bats (Tuttle 1974; Masing 1989) were built inside the final tunnel of the Rybatschi trap, but they were relatively ineffective in

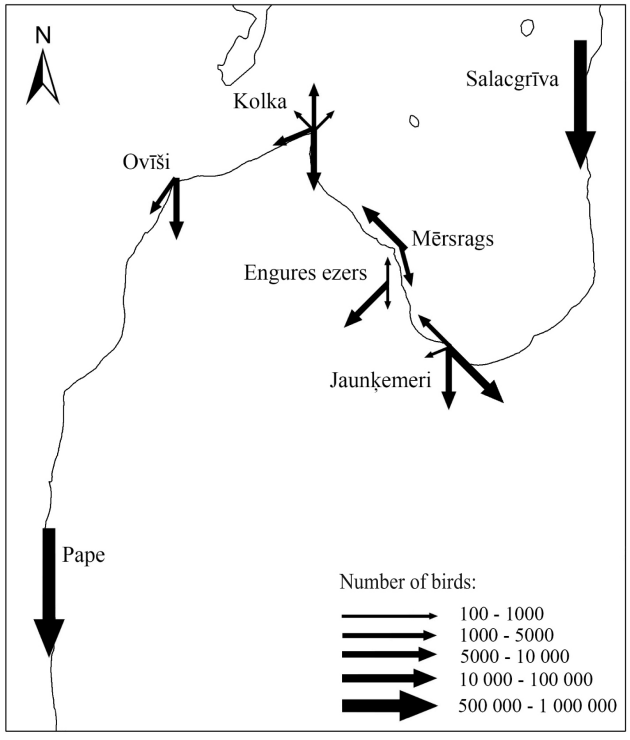

Fig. 1. Estimated numbers of migrating Passerine birds at coastal locations of Latvia, autumn 1958, when the choice to establish Ornithological station in Pape was made (redrawn after Mihelsons et al. 1960).

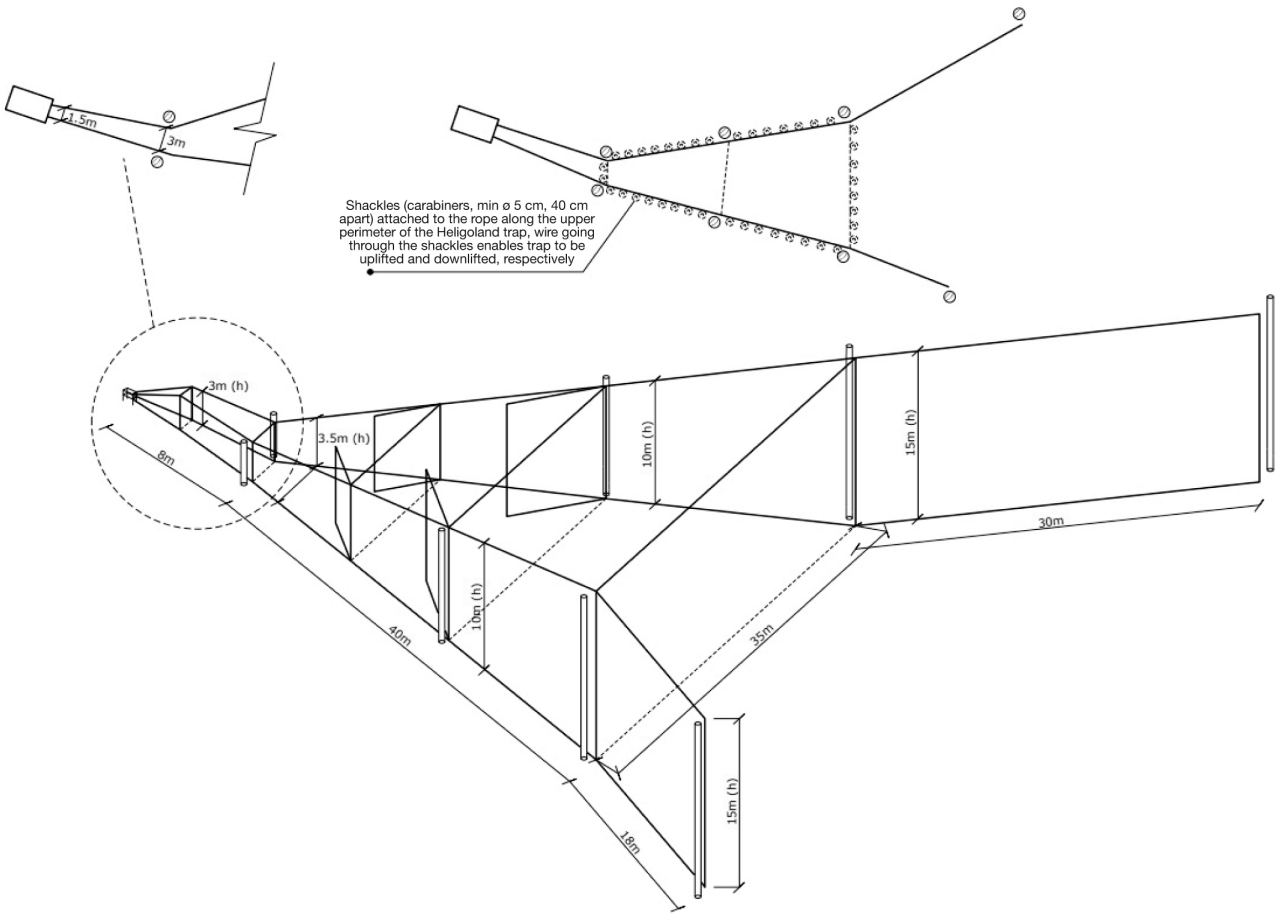

Fig. 2. Scheme of the trap build in Pape in 2014 for bat trapping (drawing by Reinis Priedols).

comparison to active trapping of bats flying in the tunnel by butterfly net (Pētersons 2004).

Construction of the funnel trap

An overall scheme of a Helgoland trap was published by Woodford and Hussel (1961), but each Helgoland type and Rybatschy type trap varies depending on the local relief and other characteristics of the surroundings and possibilities. The trap we designed and constructed in 2014 in Pape, Latvia was aimed at bat capture during the autumn migration in August – September (before autumn storm season starts at the Baltic Sea). At the entrance it was 15 m high and the end corridor was 2.0 m high; the width of the trap at the entrance was 35 m and 1.5 m at the end corridor (Fig. 2). The mesh size was 18 × 18 mm at the beginning of the trap, 12 × 12 mm at the end corridor and 8 × 8 mm at the end box in order to prevent birds and bats of smaller species to escape through the mesh at the end of the trap. The trap was attached to six poles 15 m high and two poles 3 m high (Fig. 3 and 4), produced in Latvia ("Jauda-Koks", LV–5060 Suntaži) for electrical wires. The poles are stationary in the field all year round, but the trap is installed each year at the beginning of August and removed in the middle of September. The trap can be lifted for catching, and lowered during storms, by six winches. Of the six poles with height 15 m, one broke in the 6th year of usage in 2019 (during a storm on September 10 when the trap was installed and lowered). This pole was replaced in 2020 before the beginning of the season.

Scientific use of the trap

The trap has been very successful in capture of migrating bats. The total number of captured individuals of 15 bat species during the period 2014 – 2020 was 40 896 (Table 1). The only Latvian bat species captured in Pape before this trap was build, in 1988 (Pētersons, Celmiņš 1989), but not during the period of 2014 – 2020, was the greater mouse-eared bat (Myotis myotis). The majority of the captured individuals (35 396) were Nathusius' pipistrelles (*Pipistrellus nathusii*), with maximum captures being 14 171 in 2018 (Table 1). On average during this period (2014 – 2020) there were more captures per year (5842) than ever previously, up to 3975 in 1990 (Pētersons 2004), on average 2546 per year (1988 – 1991). These data are given here only as an example, since explicit analyses of bat migration data are given in specific articles (e.g., Petersons 2004; Lindecke

Fig. 3. Pape trap from above (photo by Jasja Dekker).

Fig. 4. Pape trap from Eastern (inland) side (photo by Gunārs Pētersons).

Table 1. Number of bat species and individuals captured in the Pape trap in 2014 – 2020

Species / species group	2014	2015	2016	2017	2018	2019	2020	Total 2014 – 2020
Pipistrellus nathusii	1596	2172	4864	2038	14171	6583	3972	35396
Pipistrellus pipistrellus	–	–	–	5	1	–	–	6
P. pipistrellus / pygmaeus	–	–	1	–	–	–	–	1
Pipistrellus pygmaeus	83	222	741	421	529	1171	595	3762
Nyctalus noctula	4	7	32	32	75	270	39	459
Nyctalus leisleri	–	1	–	–	–	5	–	6
Vespertilio murinus	14	17	76	110	261	329	53	860
Eptesicus nilssonii	2	4	22	55	25	46	18	172
Eptesicus serotinus	2	1	1	3	8	7	2	24
Myotis dasycneme	–	2	1	–	–	–	–	3
Myotis daubentonii	2	2	7	9	7	10	12	49
Myotis brandtii	1	3	7	9	11	12	4	47
Myotis mystacinus		2		–	1	4	2	9
Myotis nattereri	1	2	2	5	9	14	5	38
Barbastella barbastellus	–	1	3	2	3	2	–	11
Plecotus auritus	4	1	5	9	5	25	4	53
Total:	*1709*	*2437*	*5762*	*2698*	*15106*	*8478*	*4706*	*40896*

et al. 2019).

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