Supplementary material

Pekka J. Lehtonen* & Jyrki Lappalainen 2022: Individual variation in song of Black-throated Divers (*Gavia arctica*) — Ornis Fennica 99: 15–25.

P. Lehtonen, Toppelundintie 5 F 33, FI-02170 Espoo, Finland
*Corresponding author's e-mail: pelehtonen@gmail.com

J. Lappalainen, Faculty of Biological and Environmental Sciences, Ecosystems and Environment Research Programme, P.O. Box 65, FI-00014 University of Helsinki, Finland

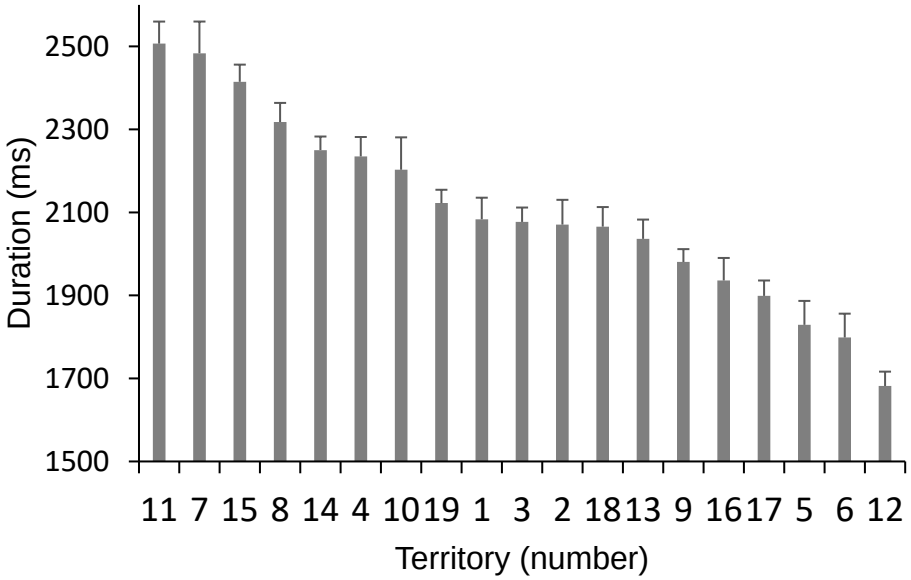

Fig. S1. Average duration (+ 1 STD) from the beginning of the introductory phrase to the end of the first repeat phrase (D1+DGAP+DR1) in descending order in different territories. The number of analysed yodels per territory varies from 6 (in territory 18) to 46 (in territory 1). Note the scale in y-axis.

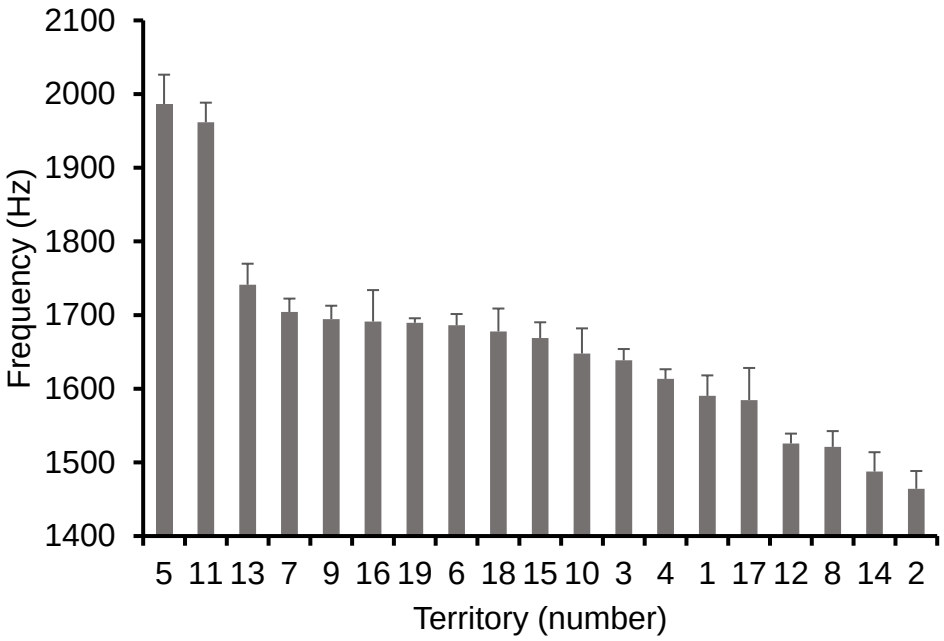

Fig. S2. Average frequencies (+ 1 STD) at the end of the second note (FI2E, Table 1) of the introductory phrase in descending order in different territories. The number of analysed yodels per territory varies from 6 (in territory 18) to 46 (in territory 1). Note the scale in y-axis.

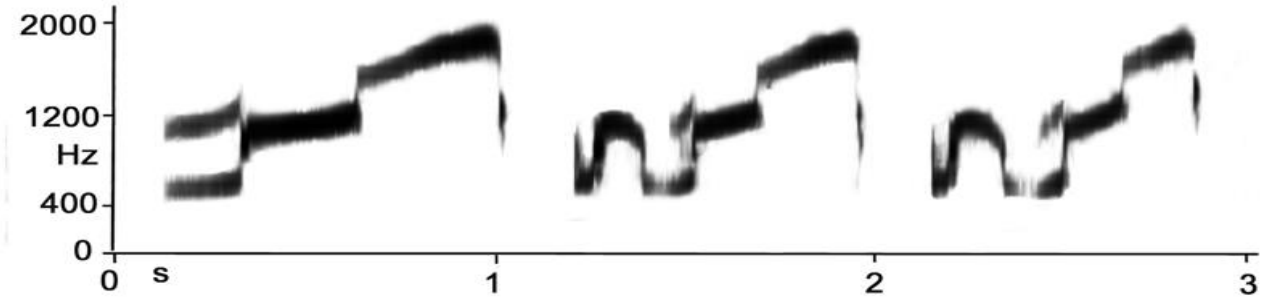

Fig. S3. Occasionally, the second note of the introductory phrase and repeat phrases have one or more abrupt changes in frequency.

Table S1. Misclassified yodels in discriminant analysis after cross-validation of all data. In territories 2, 4, 5, 8, 9, 11-14, 17, and 18, all posterior probabilities were $p < 0.01$, and those territories are not shown. Highest probability marked in bold. – marks posterior probability less than $p < 0.01$.

From Territory	Classified into Territory	Study year	Posterior Probability of Membership in Territory							
			1	3	6	7	10	15	16	19
3	19	2021	0.09	0.38	-	-	-	-	-	**0.54**
6	16	2021	-	-	-	-	-	-	**1.00**	-
7	15	2019	-	-	-	0.02	-	**0.98**	-	-
7	15	2019	-	-	-	0.30	-	**0.70**	-	-
16	19	2020	0.04	0.03	-	-	-	-	0.09	**0.85**
16	6	2021	-	-	**0.80**	-	-	-	0.20	-

Table S2. Misclassified yodels in test data using yodels only from the last year. In territories 2, 5, 8, 9, 11, 12, 14, and 17, all posterior probabilities were $p < 0.01$, and those are not shown. Highest probability marked in bold. – marks posterior probability less than $p < 0.01$.

			Posterior Probability of Membership in Territory										
From Territory	Classified into Territory	Study year	1	3	4	6	7	10	13	15	16	18	19
3	19	2021	0.03	-	-	-	-	-	-	-	-	-	**0.97**
3	19	2021	0.01	-	-	-	-	-	-	-	-	-	**0.99**
3	19	2021	-	0.50	-	-	-	-	-	-	-	-	**0.51**
4	19	2021	-	-	0.01	-	-	0.16	-	-	-	-	**0.83**
6	16	2021	-	-	-	-	-	-	-	-	**0.94**	-	0.06
13	18	2021	-	-	-	-	-	-	0.09	-	-	**0.91**	-
15	7	2021	-	-	-	-	**0.76**	-	-	0.24	-	-	-
15	7	2021	-	-	-	-	**0.76**	0.03	-	0.21	-	-	-
15	7	2021	-	-	-	-	**0.99**	-	-	0.02	-	-	-
16	18	2021	-	-	-	0.02	-	-	-	-	0.01	**0.95**	0.02
16	6	2021	-	-	-	**0.95**	-	-	-	-	0.06	-	-
16	6	2021	-	-	-	**0.79**	-	-	-	-	-	-	0.20
16	6	2021	-	-	-	**0.61**	-	-	-	-	0.39	-	-

Recording (as separate mp3-file in the supplementary files)

Yodels_in_territories_1_and_5.MP3

Two BTD male yodels from territories 1 and 5. In the recording, the start times of the yodels are as follows: territory 5: 1.5s, 13.8s and 27s; territory 1: 6.4s and 21.1s). It is often difficult to distinguish different yodels by human ear but the yodel of the territory 5 (Figs. S2 and S3) is an exception. This is due to sudden change in frequency during the second note of the introductory phrase and the second note of the first repeat phrase: The sudden change rises the frequency about 350Hz (Fig. S3).