

Passive acoustic monitoring of male rutting vocal activity in five Russian populations of red deer and wapiti

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<http://www.bioacoustica.org>

Aim:

- In polygynous red deer (*Cervus elaphus*), a prolonged rutting vocal activity represents a prominent part of male reproductive behaviour.
- We compare male vocal rutting activity in five populations and estimate effects of rut phase, time of day and temperature on vocal activity.

Methods:

- September-October 2015-2017
- 10 SongMeter SM2+ automated recorders (two per population, asynchronous recording, between-device distance 300-500 m)
- 5 min/hour, 24 hours/day, 60-70 days per each device
- Five populations of red deer: two population of European deer *C.e. hippelaphus* (Belgorod 2016; Bryansk, 2016), Siberian wapiti *C.e. sibiricus* (Kostroma, 2015) and two populations of Far-East wapiti *C.e. xanthopygus* (Ussury, 2015; Khabarovsk, 2017)

Analysed in total

111824 calls

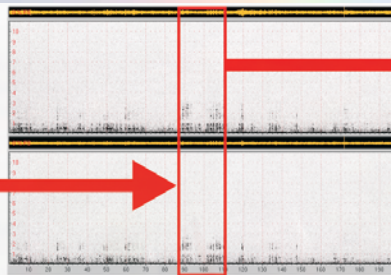
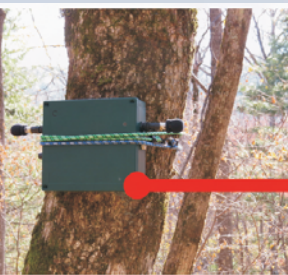
Belgorod 78023

Bryansk 12223

Kostroma 17955

Ussury 926

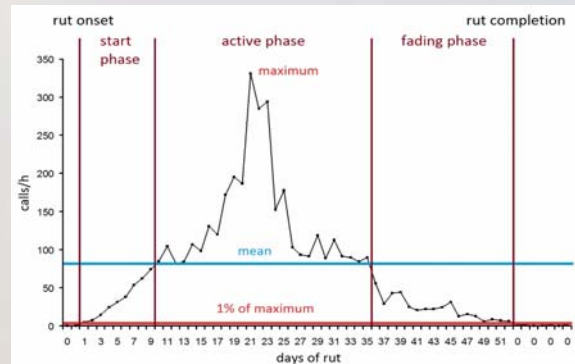
Khabarovsk 2697



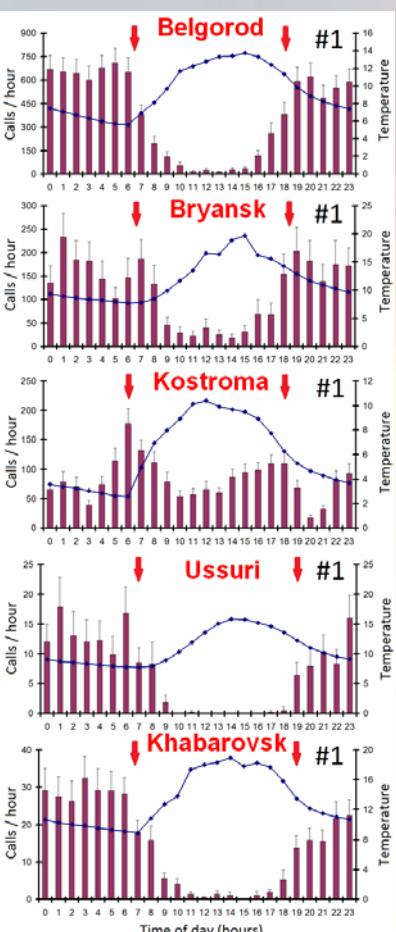
Results:

Subdividing rut phases

- Maximum and mean call number were calculated for the entire rut period.
- Rut onset and completions were selected as days when call number/hour reached 1% of the maximum.
- Start phase was set between onset day and day with mean call number/hour.
- Active phase was set between two days with mean call number/hour.
- Fading phase was set from day with mean call number/hour to the completion day.



Time of day graphs of the vocal activity (calls/hour) against the mean hourly temperature



- Decrease of vocal activity (calls/hour) was observed in all populations for the exclusion of Kostroma in the light time of day, between 09:00 and 17:00-18:00.
- The maximum vocal activity was observed in all populations for the exclusion of Kostroma between 01:00 and 03:00.
- Two additional peaks of vocal activity were also observed at sunrise (06:00-07:00 for Belgorod, Bryansk, Kostroma and Ussury) and at sunset (17:00-18:00 for Kostroma and 19:00-21:00 for Belgorod, Bryansk, Ussury and Khabarovsk).



Rut parameters

Five populations, two Song Meter devices (1&2) per population

Rut parameters	Belgorod 2016		Bryansk 2016		Kostroma 2015		Ussury 2015		Khabarovsk 2017	
	1	2	1	2	1	2	1	2	1	2
Rut duration (days)	56	56	35	39	52	52	45	43	53	51
Start phase (days)	11	10	13	9	9	10	17	14	9	8
Active phase (days)	27	29	18	20	26	24	12	12	24	22
Fading phase (days)	18	17	4	10	17	18	16	17	20	21
Maximum (calls/hour)	1324	1560	512	271	331	351	46	19	54	33.5
Mean (calls/hour)	377.3	319.4	117.4	50.9	82.1	90.3	6.8	3.7	14.5	11.4

- Vocal activity (calls/hour) was highest in Belgorod, intermediate in Kostroma and Bryansk and weakest in Khabarovsk and Ussury.
- Rut duration was longest in Belgorod, Kostroma and Khabarovsk, intermediate in Ussury and shortest in Bryansk.
- The active phase was longest in Belgorod, Kostroma and Khabarovsk, intermediate in Bryansk and shortest in Ussury.
- Devices within locality displayed different numbers of calls/hour, but similar dynamics of vocal activity.

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