

MONITORING OF THE LARGE CARNIVORES IN LITHUANIA: EXPERIENCE AND FIRST RESULTS

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Two species of large carnivore mammals - wolf (*Canis lupus*) and lynx (*Lynx lynx*) constantly inhabit Lithuania and reproduce. Brown bear (*Ursus arctos*) became extinct in the 19th century. Currently only single animals wandering accidentally from Bielorussia and Latvia to our country. The abundance and distribution of wolves and lynxes has changed very much during the last centuries. At the end of the 19th century, these animals were near extinction and inhabited only remote and inaccessible places (Lietuvos fauna, 1988). During World War I and especially World War II, wolf numbers increased again: in 1948 according to the survey of game animals there were about 1.7 thousand wolves. They created much damage to domestic animals and the not numerous at that time ungulate animals. Therefore, intensive wolf hunting and extermination by various means was organised. In a short time, the number of these animals decreased to 30-60 individuals in the second part of seventies. Later, when defending wolves as the "order of nature" begin, their number started to increase and reached 500-600 in the last ten years. In the first half of the 20th century lynxes become very rare. But in the second half of the century their number increased to approximately 200 in the eighties and nineties. In the last ten years, the number of lynxes decreased again by half. Their hunting has been forbidden since 1978 and the species is included into Red data book of Lithuania in 2000 (Bluzma, 1999; 2000).

Large carnivores are the objects of strict protection in the European Union. Their hunting is prohibited (there can be some exceptions for some countries) and it is necessary to establish territories of special protection. Large carnivores are strictly protected according to the Bern convention, which

Introduction

Lithuania has signed. According to this convention the co-ordination of measures at the scale of all Europe, international co-operation, preparation and realisation of national and European action plans for protection are necessary for the protection of these animals. Monitoring of large carnivores in all signed countries was provided as one of the significant means of protection of mentioned species.

Having in mind the huge ecological, economical and nature protection value, scarce investigations of wolf and lynx status in Lithuania, as well as high requirements of countries of the European Union to the protection of these species, monitoring of the wolf and lynx populations was started in Lithuania. The aim was to estimate the status of population, to clarify numbers, trends and their causes. Apart from professionals from the Institute of Ecology some staff from the protected territories (strict nature reserves, national and regional parks) took part in this project. For them a special training workshop was organised. Unfortunately, after three years of work, wolf and lynx monitoring almost collapsed due to the absence of financial position. However, the original results and experience are worthy of attention and more detailed discussion, so this project should be continued.

Methods

Selection of the sample plots

20 sample plots were selected (Fig. 1) with a forest area of no less than three thousand ha. Sample plots were selected in the forests constantly inhabited or systematically attended by wolves and lynxes (according to investigations in 1995, see Bluzma, 1999). In selection of the sample plots we tried to scatter them regularly across the country and to cover all diversity of nature. First of all, analysis of cartographic material was made. Using forest maps, potential sample plots, which may fit to wolves and lynxes, were selected according to the area and suitability. Big forest areas were subdivided into smaller (5-10 thousand ha) parts as to separated units. The dependence of each sample plot to the three indicators: 1) geo-

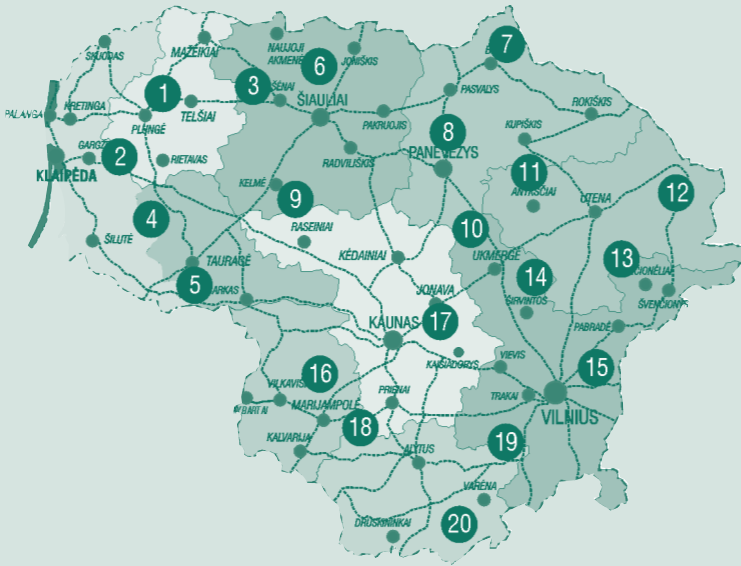


Fig. 1
Localization of the sample plots

graphic districts (physical geographical zonation), 2) landscape character, 3) forest stand composition (pine stands, fires stands, deciduous stands) were estimated. Characteristics of the 20 required sample plots were defined according to the distribution in the scale of above-mentioned indicators (Table 1). The exact location of the sample plots were selected using a table of random numbers. In the cases when places selected according to all indicators were close to the near forest in protected territories, these forests were selected for the investigations. This makes far more favourable conditions for the activity in the monitoring investigations for employers of these territories.

A copy of a 1:50 000-scale map with the survey route was prepared for each sample plot. The survey routes were calculated in such manner that they make an uninterrupted line, fairly regularly cross the territory of the sample plot and cover places, which may be most frequently attended by wolf and lynx. For amore comfortable registration and analysis of the

Calculation of the survey routes

Table 1
Characteristic of the
sample plots for the
wolf and lynx
monitoring.

Plot No	Administrative district	Physical-geogr. regions*	Land-scape groups**	Prevailing forest stands***	Co-ordinates	
					Lat.,N	Lon.,E
1	Plungės	BV	HME	F	56° 05'	21° 55'
2	Plungės	BIV	CP	F	55° 45'	21° 25'
3	Šiaulių	BVII	CP	P	55° 50'	22° 55'
4	Šilalės, Tauragės	BIV	CP	F	55° 25'	21° 55'
5	Jurbarko, Tauragės	CXII	SP	P	55° 08'	22° 20'
6	Joniškio	CIX	CP	D	56° 15'	23° 15'
7	Biržų	CX	CP	D	56° 15'	24° 50'
8	Panevėžio	CX	SP	P	55° 45'	24° 35'
9	Kelmės, Raseinių	BVII	HME	P	55° 35'	23° 15'
10	Ukmergės	CXI	CP	D	55° 25'	24° 35'
11	Anykščių, Kupiškio	DXIV	SP	D	55° 45'	25° 10'
12	Ignalinos, Zarasų	DXV	SP	F	55° 35'	26° 15'
13	Švenčionių	DXV	SP	P	55° 12'	25° 50'
14	Ukmergės	CXIII	CP	D	55° 10'	24° 55'
15	Vilniaus	EXIX	SP	P	54° 45'	25° 35'
16	Šakių	CXII	SP	P	54° 55'	23° 30'
17	Jonavos, Kaišiadorių	CXIII	SP	P	55° 00'	24° 15'
18	Alytaus, Marijampolės	CXII	CP	D	54° 35'	23° 55'
19	Šalčininkų	EXX	SP	P	54° 25'	25° 00'
20	Varenos	EXX	SP	P	54° 05'	24° 35'

* BIV – Western Žemaičiai plateau, BV – Middle Žemaičiai upland, BVII – Eastern Žemaičiai plateau, CIX – Žiemgala plain, CX – Mūša-Nemunėlis plain, CXI – Nevėžis plain, CXII – Nemunas lower – course plain, CXIII – Nemunas middle – course and lower – course plateau, DIV – Western Aukštaitija plateau, DV – Aukštaitija upland, EIX – Northeastern plain, EXX – Southeastern plain.

** Landscape groups: CP – clayey plains, SP – sandy plains, HME – hilly morainic eminencies.

*** Prevailing forest stands: P – pine stands, F – fir stands, D – deciduous stands.

data, all survey routes were divided into the numbered segments, 1.5-3.5 km long (average – 1.8 km). The length of survey routes and situation in the first and next years of monitoring were not the same. For the first year they were 23-37 (average – 29) kilometres long and not closed, e.g. the beginning and the end were in the different places. Later it became clear that staff during one man-day did not fulfil such survey routes. Besides that, if the survey route was not closed it was more difficult to estimate minimum animal numbers, which is very important for the monitoring index (Linnell et al., 1998). Therefore, in the second year of monitoring, two shorter (14-16 km length) and closed survey routes were calculated, at a distance of 1-5 kilometres for the each sample plots (Table 2). But the methodological problem in estimation of the minimum animal number still persists if the investigations in both survey routes are made in separate days (then the same individuals may be counted twice).

During the winter, each survey route is investigated twice (in January and February). The survey is performed when the snow cover is continuous and not less a day after snowfall, if the depth of the snow and its consistence are suitable to find and identify animal footprints. The orientation in the survey route is achieved using the map of the sample plot, compass and local landmarks. Covered distances may be re-estimated by counting of steps. All footprints of wolf and lynx are registered on the survey route. According to the footprints, the direction and number of animals are estimated. If the number of animals in the place of footprints was unclear, it was clarified following the footprints of an animal. Results were registered in the data page, indicating the number of the survey route, species, footprint direction and the number of animals. Besides, when the surveying in the survey route is over, every executive estimated how many animals made their footprints and what

Surveying in the survey route

number of these animals still remain in the surveyed territory. The duration of the snow cover and its characteristics (depth, consistence, etc.) are indicated in the data page too.

Data analysis

During the three years of monitoring, the number of sample plots surveyed lessened in the absence of financing. 16 sample plots (723 km survey route) were investigated in 1999, 7 sample plots (210 km survey route) in 2000, and 2 sample plots only in 2001. Data were analysed according to: 1) minimum animal numbers in the investigated sample plots (determined by rejecting repeating footprints of the same individuals); 2) minimum animal number in the territory framed by the survey route (determined according to the difference in number of animals entered and animals left - but this indicator was used only in the year 2000); 3) the number of footprints per 100 km survey route per day (footprints of two or more animals found in one place were counted as one footprint); 4) number of the animals per 100 km of survey route per day (the number of animals is determined by multiplying footprint number by the number of animals, which left them, and summing up products); 5) average size of animal group (obtained dividing the animal number to number of footprints).

Results

In the year 1999, wolves were registered in 14 sample plots, lynxes in four sample plots. Footprints of 110 wolves and 24 lynx were found during both investigations in survey routes. The minimum number of wolves in these sample plots was from one to seven individuals (average – 3.6 individuals/sample plot), for lynxes – one to three individuals (average – 2 individuals/sample plot). The minimum number of animals registered in the investigated areas was 51 wolves and 8 lynxes. Wolf footprint number per 100 km survey route per day in the sample plots was from 0.7 to 22.7 (average – 7.7 footprint), for lynx – from 0.7 to 9.2 (average – 1.2). The average density of wolf's footprints during the first investigation (January) was 8.3, during the second (February – March) – 6.3 footprint/100

Table 2
Results of wolf (W) and
lynx (L) monitoring in
1999-2000

Plot No	Number of the investigations		Length of the survey route, km		Minimum animal number in the sample plot		Footprint number 100 km/day		Animal number 100 km/day		Animal number/ 1 footprint (track)	
	W	L	W	L	W	L	W	L	W	L		
1999												
1	2	54	3	2	4.3	5.2	13.0	5.2	3.0	1.0		
2	2	53	3	0	6.0	0	8.4	0	1.2	0		
3	2	43	6	0	16.3	0	26.4	0	1.5	0		
4	2	62	4	0	6.5	0	8.9	0	1.3	0		
5	1	31	3	2	13.8	3.9	19.3	2.8	1.4	1.0		
7	2	46	3	3	7.9	9.2	10.7	10.0	1.4	1.1		
8	1	34	2	0	3.2	0	3.7	0	1.2	0		
9	2	58	1	0	0.7	0	0.7	0	1.0	0		
11	2	47	0	1	0	0.7	0	0.7	0	1.0		
12	2	60	0	0	0	0	0	0	0	0		
13	2	64	7	0	3.3	0	19.6	0	6.5	0		
14	1	17	3	0	17.6	0	20.6	0	1.2	0		
16	2	32	3	0	12.5	0	26.6	0	2.1	0		
17	2	74	5	0	3.4	0	8.1	0	3.0	0		
18	2	62	2	0	4.3	0	4.3	0	1.0	0		
19	2	40	6	0	22.7	0	38.1	0	1.5	0		
	29	723	51	8	7.7	1.2	13.0	1.2	1.8	1.1		
2000												
2	2	30	3	0	19.2	0	36.7	0	1.7	0		
3	2	29	5	0	20.0	0	24.0	0	1.2	0		
4	2	30	4	0	9.1	0	19.5	0	1.6	0		
12	2	60	0	0	0	0	0	0	0	0		
15	1	13	0	0	0	0	0	0	0	0		
16	2	29	2	0	2.8	0	4.0	0	1.3	0		
19	2	19	0	0	0	0	0	0	0	0		
	13	210	14	0	7.3	0	12.0	0	1.4	0		

Total/average:

Total/average:

61

km/day; for lynx – 1.0 and 1.3 footprint/100 km/day respectively.

The number of wolf individuals per 100 km of the survey route per day was from 0.7 to 38.1 (average – 13.0), lynx – from 0.7 to 10.0 (average – 1.2 individuals). The average wolf number during the first investigation was 17.1 individuals/100 km/day, during the second – 8.9 individuals/100 km/day; for lynx – 1.0 and 1.3 individuals/100 km/day respectively. Average wolf pack size in different sample plots (number of individuals for one track) was from 1 to 6.5 individuals (average – 1.8). During the first investigation this indicator was 2.0, during the second – 1.4 individuals/track; lynx – 1.0 and 1.2 individuals/footprint respectively (average – 1.1). This number indicates that in the second part of the winter, the activity of wolves and average number in each pack were less than in the first part of winter. Lynx activity and pack size remained unchanged or slightly rose. These species-level differences may be explained as depending on animal ecology and different way of life. In the year 2000, wolves were registered in four out of seven investigated sample plots, while lynxes were not found. Average indicators (density of footprints and animals in the survey route, pack size) for wolf are similar to the results from the year 1999, but due to the limited sample size they are hardly comparable.

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STAMBIŲJŲ PLĖŠRŪNŲ MONITORINGAS LIETUVOJE: PATIRTIS IR PIRMIEJI REZULTATAI

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Pateikiami pirmieji 1999-2000 metais vykdyto vilkų ir lūšių monitoringo rezultatai. Tyrimams parinkta 20 stacionarų, kurie reprezentuoja skirtingus šalies regionus, dominuojančius landšaftus bei miško medynus. 1999 metais ištirta 16 stacionarų, kuriuose minimalus žvėrių skaičius buvo 51 vilkas ir 8 lūšys. Vidutinis vilkų pėdsakų skaičius 100 km maršruto per parą buvo 7.7, lūšių – 1.2 pėdsako. Vidutinis vilkų grupės dydis buvo 1.8 individo, lūšių – 1.1 individo. Vėlesniais tyrimų metais nesant finansavimo darbų apimtis labai sumažėjo.