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Abstract: To assess the status of lynx we analysed lynx signs of presence within the Italian Alps from 2000–2004. A total of 411 signs of lynx presence have been collected, compared to 261 signs during the previous pentad. Lynx tracks were the most frequent sign of presence, followed by prey remains and direct observations. Livestock depredation has so far not been a problem in Italy. Most of the presence signs (84%) are still concentrated in the Eastern Italian Alps in Friuli V.G. and the province of Belluno. A few confirmed lynx signs of presence indicate a recolonisation of the Trentino Alto Adige region. In the western Alps (Piemonte region), most signs of lynx presence are concentrated close to the French border. The number of lynx occurring in Italy is roughly estimated to less than 20 individuals. The population cannot be considered viable and is still depending on immigration from neighbouring countries.

**Status of the Eurasian lynx (*Lynx lynx*) in the Italian Alps: an overview
2000–2004**

Status risa (*Lynx lynx*) v Italijanskih Alpah: pregled za obdobje 2000–2004

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Abstract. To assess the status of lynx we analysed lynx signs of presence within the Italian Alps from 2000–2004. A total of 411 signs of lynx presence have been collected, compared to 261 signs during the previous pentad. Lynx tracks were the most frequent sign of presence, followed by prey remains and direct observations. Livestock depredation has so far not been a problem in Italy. Most of the presence signs (84%) are still concentrated in the Eastern Italian Alps in Friuli V.G. and the province of Belluno. A few confirmed lynx signs of presence indicate a recolonisation of the Trentino Alto Adige region. In the western Alps (Piemonte region), most signs of lynx presence are concentrated close to the French border. The number of lynx occurring in Italy is roughly estimated to less than 20 individuals. The population cannot be considered viable and is still depending on immigration from neighboring countries.

Keywords: *Lynx lynx*, Italy, monitoring, status, Alps

Introduction

Re-introduction programmes of lynx are not known to have been carried out successfully in Italy (RAGNI & al. 1998). But as a consequence of re-introduction projects in Switzerland, Slovenia and Austria, the lynx returned to Italy at the beginning of the 1980s (GUIDALI & al. 1990, RAGNI & al. 1998, MOLINARI 1998, BOLOGNA & MINGOZZI 2003). They spread from the Austrian and Slovenian re-introduction sites towards the north-east of the Friuli V.G. region where they established a regular occurrence (MOLINARI & al. 2001). A second, isolated occurrence of unknown origin was reported from the southern Dolomites in the Trentino region (RAGNI & al. 1998). However, by the end of the 1990s, the trend in the Trentino occurrence was clearly negative, as only very few signs of lynx presence were collected (MOLINARI & al. 2001). Besides, some scattered observations were recorded also from the Val d'Aosta and the Piemonte close to the Swiss border (MOLINARI & al. 2001, BOLOGNA & MINGOZZI 2003).

In the frame of the SCALP (Status and Conservation of the Alpine Lynx Population), each Alpine country updates the status and distribution of lynx in the respective territory in a 5-year rhythm. Here we report on the development of lynx signs of presence within the Italian Alps from 2000–2004, outline trends per region and estimate the number of lynx present.

Methods

The collection of lynx signs of presence is effectuated by means of a network of people, mainly game wardens and foresters, who have attended special training courses. The number of trained people varied between regions as follows: 3 Liguria, 10 Piemonte, 25 Val d'Aosta, 5 Lombardia, 50 Trentino Alto Adige, 20 Veneto, 40 Friuli V.G. (on the whole, $n = 153$ people). 35% of these persons attended for the first time a training session, while for the others it was a repetition, as they had been already trained during the previous pentad. Whenever possible, these "lynx experts" verified the signs of presence reported to them by the general public. Within each region, one or two persons were responsible for the centralisation of the data. We distinguished three levels of data reliability in accordance with the SCALP guidelines (MOLINARI-JOBIN & al. 2003) and the possibility to verify the collected data: Category 1 signs (C1) represent the hard facts, e.g. all reports of lynx killed, found dead, photographs or videos of lynx as well as scats that have been genetically analysed. Category 2 signs (C2) include all records of wild prey remains, livestock killed and tracks confirmed by people who attended special courses, e.g. mainly game wardens and foresters. As all these professionals were instructed in how to recognise lynx signs of presence, these records are mostly an objective proof of lynx presence, though both errors and even deception may occur. Category 3 signs (C3) represent all signs of lynx presence reported by the general public as well as all sightings and vocalisations, e.g. signs that cannot be verified. To estimate the extent of lynx occurrence area, we buffered the point data with a buffer of a radius of 5 km, resulting in an approximate area of 80 km², which corresponds to an average female home range size (BREITENMOSER-WÜRSTEN & al. 2001).

To improve data quality and to get a minimum number of lynx present we installed camera traps at fresh kills whenever possible in the Friuli V.G. region from 2003 onwards. Due to the unique coat pattern, lynx can be identified individually by their photographs (LAASS 1999). Besides, from 19. February to 8. April 2004, 12 camera traps have been installed systematically on game passages in the Julian Alps of Friuli V.G. The Minimum Convex Polygon covered with camera traps comprised an area of 50 km². All spatial analyses have been performed in the Geographic Information System (GIS) ArcView 3.3 (ESRI 1996 a,b,c).

Results

From 2000–2004, a total of 411 signs of lynx presence have been collected, compared to 261 signs during the previous pentad (MOLINARI & al. 2001). Overall, 56% of all signs recorded belong to the categories of C1 and C2, thus have been confirmed (Table 1). Although in 2003 no C1 data was reported, it was the year with the highest number of lynx signs of presence. Lynx tracks, of which 82% have been verified (C2), were the most frequent sign of presence. Livestock depredation has so far not been a problem in Italy. Only two cases of reproduction were reported: both were direct observations of two independent people (Italo Buzzi & Caterina Rinaldi) who saw a lynx with two kittens traversing a road in the Carnic Alps (Pontebba) in 2003 on two consecutive days in October (Fig. 1c).

Table 1: Number of lynx records collected per year per category.

	2000	2001	2002	2003	2004	Total
CATEGORY 1						
Photo		1	1		2	4
Scats ¹	1	1				2
Total	1	2	1	0	2	6
CATEGORY 2						
Livestock killed	1		1			2
Wild prey remains	7	10	8	24	15	64
Tracks	13	23	27	53	44	160
Total	21	33	36	77	59	226
CATEGORY 3						
Wild prey remains	4	4	7	11	13	39
Tracks	9	7	5	4	10	35
Sightings	23	11	23	24	16	97
Vocalisations				3		3
Scats	1			1	3	5
Total	37	22	35	43	42	179

¹ Genetically confirmed lynx scats.

Most of the presence signs (84%) are still concentrated in the Eastern Italian Alps in Friuli V.G. and the province of Belluno (Fig.1, Tab. 2). It is also in this area where most effort was made to verify lynx signs of presence, as 62% of signs of presence are C2 whereas in the Central Alps, 18% are verified and in the Western Alps 6%, respectively.

Table 2: Number of C2 data recorded per region and year.

Year	Val d'Aosta	Piemonte	Trentino Alto Adige	Veneto	Friuli	Total
1992	1			1	11	13
1993	3		1	1	6	11
1994			5	1	8	14
1995		1	1	5	14	21
1996				1	12	13
1997			1	1	12	14
1998		1		6	10	17
1999	5	3			9	17
2000	1		1	1	18	21
2001			4		29	33
2002		1		2	33	36
2003				1	76	77
2004			1		58	59
Total	10	6	14	20	296	346

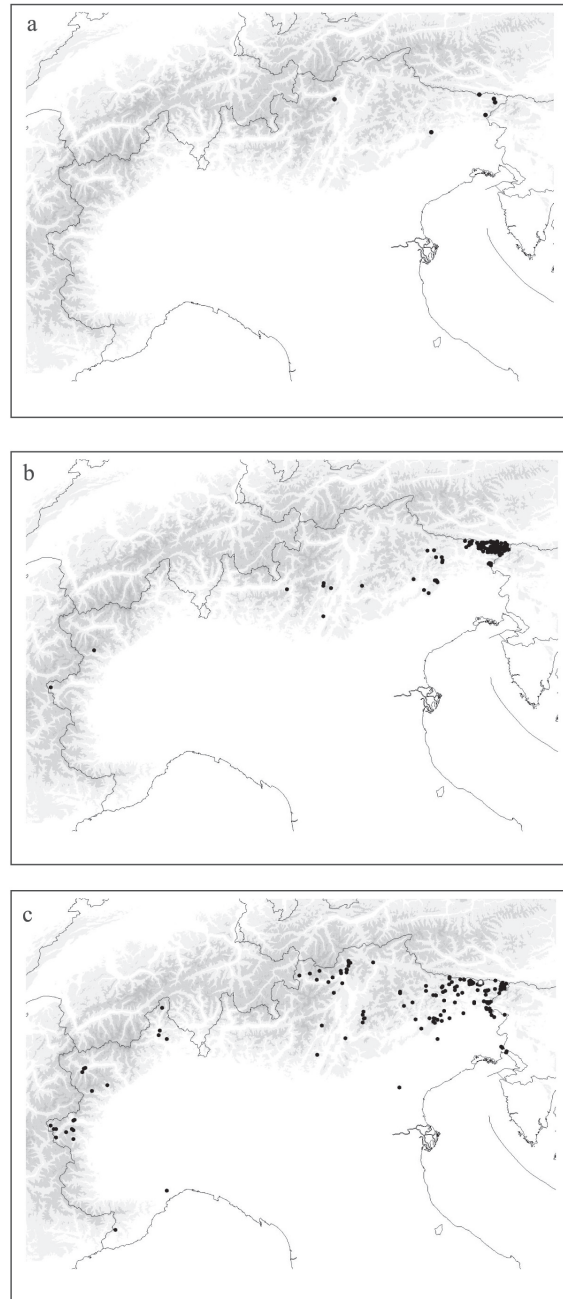


Fig. 1: Distribution of lynx signs of presence in the Italian Alps for the five-year period 2000-2004. (a) Category 1 data: photos, confirmed scats. (b) Category 2 data: killed livestock, confirmed wild prey remains and tracks. (c) Category 3 data: unconfirmed wild prey remains and tracks, sightings and vocalizations. The white dot indicates the area where reproduction was observed.

The area occupied by lynx estimated by means of a 5 km radius buffer ranged from 433 km² of the C1 data, 2491 km² of the C2 data to 6534 km² of the C3 data. Since some of the C3 data are very geographically isolated and lynx experts were not able to confirm lynx presence within the 5 years considered but on the other hand the C1 data is highly depending on monitoring effort, we consider the 2491 km² of the C2 data most realistic.

In the Italian Alps, 5 different lynx were photographed until the end of 2004. The first photos were made as early as 1989, when a game warden (Carlo Vuerich) took photos of a lynx hunting a marmot in the Carnic Alps, Friuli V.G. (Molinari 1998). The second photo was taken by a forest warden (Paolo de Martin) in the Julian Alps, Friuli V.G. in 2001 and the third by a game warden (Eduard Gassebner) in the Alto Adige in 2002 (Fig. 1). In 2003 no lynx was pictured, although camera traps have been installed at 6 different kills in Friuli V.G. Unfortunately, either the lynx did not come back or the camera trap did not work. In 2004, camera traps were installed at 8 different kills in Friuli V.G. and at two occasions photos of two different individuals were taken, one in the Julian and one in the Carnic Alps (Walter Vuerich, Maria Festa). On game passages, camera traps were active in 2004 during 308 trap nights but no lynx was pictured.

Discussion

Lynx signs of presence have increased in the early 2000s compared to the previous period. This trend has to be at least partly explained by increased monitoring effort. The only area with newly detected presence of lynx is the western Friuli V.G. where a lack of monitoring effort has been reported previously (MOLINARI & al. 2001). The distribution of the 2000–2004 data indicates a contiguous population from north-eastern Friuli V.G. through to the province of Belluno (Fig. 1), although more effort is needed to confirm lynx signs of presence. In Friuli V.G., the number of C2 records increased considerably (Table 2). However, by means of camera traps only 2 different individuals were distinguished, one in the Julian and the other in the Carnic Alps. Unfortunately, on the photo of 2001 in the Julian Alps we were not able to identify the lynx. Camera trapping effort was reduced in 2004 to a small area of only 50 km² and a short period due to low budget. During this time no lynx was pictured nor during the checking of camera traps tracks have been found. We conclude that even in this area of Italy, where most signs of presence come from, only few individuals are present. But the use of camera traps to identify more different individuals will be extended in the future.

Except for north-eastern Italy, lynx occur only in areas bordering with Switzerland or France. While in the canton of Valais in Switzerland the trend of reported lynx signs of presence decreased since 2000 (ZIMMERMANN & al. 2004), in France, the trend is positive in the northern French Alps (MARBOUTIN & al. this volume). In Piemonte, most signs of lynx presence are concentrated in the Upper Susa Valley, close to the French border (Fig. 1c). A few confirmed lynx signs of presence indicate a recolonisation of the Trentino Alto Adige region. In 2002, a game warden (Eduard Gassebner) from the Province of Alto Adige presented a close-up photo of a lynx. Afterwards, some C3 data were collected from the same area. We suspect that the lynx most probably has been released from captivity, as it was the same year as Italian law changed the conditions for keeping “dangerous” animals.

The number of lynx occurring in Italy is roughly estimated to less than 20 individuals. The population cannot be considered viable and is still depending on immigration from neighboring countries.

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