

## PRESENT STATUS AND DISTRIBUTION OF THE EURASIAN LYNX (*LYNX LYNX*) IN THE ITALIAN ALPS

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**ABSTRACT** - To analyse the status and distribution of lynx in the Italian Alps from 1995 to 1999, all signs of lynx presence found were pooled, evaluated and interpreted with the same method. We distinguished three levels of reliability in accordance with the SCALP guidelines and the possibility to verify the collected data: Quality 1 (Q1) represent the hard facts, e.g. all reports of lynx killed, found dead or photographs and videos of lynx. Quality 2 (Q2) include all records of wild prey remains, livestock killed, tracks and scats confirmed by people who attended special courses, e.g. mainly game and forest wardens. Quality 3 (Q3) are all signs of presence reported by the general public as well as all sightings and vocalisations, e.g. mainly signs that cannot be verified. A total of 261 signs of lynx presence were recorded in the Italian Alps, of which 85 were Q2, the remaining were Q3 as no Q1 data was reported. The Q2 data was confined to four different areas whereas the Q3 data showed a scattered distribution in all the Alps. The dynamics in the Italian Alps during the past pentad was characterised by four main events: (1) the positive trend that had been observed in the north-east of Friuli V.G. (the Tarvisiano) up until 1995 decreased, but (2) at the same time an increased number of data was reported from north-east of the Veneto (Province of Belluno). Consequently, in the south-eastern Alps more data were collected over a bigger area than in the previous pentad. (3) The lynx occurrence of unknown origin in the Trentino has gone extinct again. And (4) the suspected presence of lynx in the Val d'Aosta and in the northernmost Piemonte (Val d'Ossola) was confirmed by Q2 data. In Italy, lynx still have not established a vital population even though suitable habitat is available from the south-western through to the eastern Alps. With the exception of the new occurrence in the province of Belluno, lynx occur only in areas bordering with Slovenia and Switzerland, where vital populations exist. Italy will play an important role for the future of the lynx in the Alps, as its territory connects the two vital populations from Slovenia and Switzerland.

*Key words:* *Lynx lynx*, monitoring, distribution, Alps, Italy.

### INTRODUCTION

As a consequence of re-introduction projects in Austria, Slovenia and Switzerland, the lynx returned to Italy at the beginning of the 1980's (Molinari, 1991; Ragni and Possenti, 1991): they spread from the Austrian and Slovenian re-introduction sites towards the north-east of the Friuli V.G. region (Tarvisiano) where they

established a regular occurrence (Molinari, 1998); a second, isolated lynx occurrence of unknown origin was reported from the southern Dolomites in the Trentino region (Ragni *et al.*, 1998); besides, some scattered observations were recorded also from the Val d'Aosta and the Piemonte close to the Swiss border (Val d'Ossola).

During the first 15 years, the number of signs of presence as well as the area of lynx presence increased in both the Trentino and the Tarvisiano, indicating increasing lynx numbers. From 1985 to 1994, three lynx were found dead, of which 2 were killed illegally. Furthermore, at least eight other cases of poaching were suspected, but the carcasses were never found.

In this report we will give an overview of the present status and distribution of the lynx in the Italian Alps from 1995 to 1999. The presence of lynx is a relatively new phenomena in most parts of the Italian Alps. Therefore we were only able to assess the population trend for the Tarvisiano, as this is the only area for which data have been collected consistently over 15 years. For the other areas only presence/absence data were collected.

## METHODS

Since the 1<sup>st</sup> SCALP Symposium in 1995 great effort was made to improve the Italian monitoring system. This was achieved by (1) expanding it to most of the Italian Alps and (2) by improving the data reliability. The main activity still consisted in collecting all signs of lynx presence. More effort was made to verify records reported by the general public. All data collected were pooled, evaluated and interpreted with the same method.

We distinguished three levels of reliability in accordance with the SCALP guidelines and the possibility to verify the collected data: Quality 1 signs (Q1) represent the hard facts, e.g. all reports of lynx killed, found dead or photographs and videos of lynx. Quality 2 signs (Q2) include all records of wild prey remains, livestock killed, tracks and scats confirmed by people who attended special courses, e.g. mainly game and forest wardens. 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. Quality 3 signs (Q3) represent all signs of presence reported by the general public as well as all sightings and vo-

calisations, e.g. mainly signs that cannot be verified. When studying distribution, isolated Q3 data are of reduced significance, but their repeated occurrence in the same areas, if reported by different persons, were utilised to raise the search effort in this area to try to confirm the presence of the species with objective data.

Only people who attended special courses were in charge of the data validation. Two levels of expertise were achieved: The Italian Lynx Project practically trained in Switzerland, where more than 15 lynx were radio-collared, 17 game and park wardens to recognise signs of lynx presence. These experts are distributed over all 7 Alpine regions of Italy. Besides, special courses were organised for 272 official game wardens and foresters and instructive material was produced (e.g. Molinari *et al.* 2000). In addition, speeches were given to hunters, farmers and foresters to increase the rate of reporting lynx presence.

The data obtained by this monitoring still have to be interpreted cautiously: (1) As the courses were concentrated in areas where lynx were already present or might appear in the near future (the eastern and north-western Alps), the effort to verify signs of presence is not distributed evenly. The search effort should be increased in areas where several Q3 data were collected. (2) Some organisations did not want to participate in the Alpine-wide monitoring system. But (3) the biggest problem for the detection of lynx signs of presence remains the roughness of the terrain and the abandonment of the mountains by rural people.

To support the monitoring data, two photo-trap sessions were organised in the Tarvisiano and an inquiry of 130 different organisations was made to gain data on the state of knowledge about lynx and its distribution over the whole Italian Alps.

## RESULTS

From 1995 to 1999, a total of 261 signs of lynx presence were recorded in the Italian

Table 1 - Number of Q2 data recorded from 1995 to 1999 in Italy per region.

Type of Q2 data	Tarvisio	Belluno	Trento	Val d'Ossola	Val d'Aosta	Total
tracks	37	11	2	2	0	52
scats	1		1			2
wild prey remains	20	2	1	3	5	31
Roe deer ( <i>C. capreolus</i> )	10	2	1	1	1	15
Red deer ( <i>Cervus elaphus</i> )	9					9
Chamois ( <i>R. rupicapra</i> )	1			2	2	5
Ibex ( <i>Capra ibex</i> )					1	1
Marmot ( <i>M. marmota</i> )					1	1
Total	58	13	4	5	5	85

Alps, of which 85 were Q2 signs (Table 1), the remaining were Q3 signs, as no hard fact data was reported. The Q2 data was confined to four different areas (Fig. 1a) whereas the Q3 data showed a scattered distribution in all the Alps (Fig. 1b). But most of the Q3 data were sightings that cannot be verified.

The dynamics in the Italian Alps during the past pentad was characterised by four main events: (1) in the Tarvisiano, the positive trend observed until 1995 (Molinari, 1998) has decreased, (2) but at the same time an increased number of data was reported from north-east of the Veneto (Province of Belluno). Consequently, in the south-eastern Alps more data was collected over a bigger area than in the previous pentad. (3) The lynx occurrence of unknown origin in the Trentino has gone extinct again. And (4) the suspected presence of lynx in the Val d'Aosta and in the northernmost Piemonte (Val d'Ossola) was confirmed by Q2 data.

The prey species killed indicated a difference in prey selection in the eastern and western Alps (Table 1). In the Tarvisiano, where red deer (*Cervus elaphus*) is very common, they were often killed. In the Val d'Aosta, where red deer is rare but ibex (*Capra ibex*) are common, ibex was reported as lynx prey. However, we need more data to confirm this trend. The inquiry revealed that 30% of all provinces state that lynx is present in their territory, in 37% of the provinces lynx is absent and 33% have no information about lynx presence. However, even though 13 provinces claimed

that lynx were present, our monitoring confirmed the lynx presence with Q2 data only in 5 provinces.

#### Eastern Italian Alps

In the Tarvisiano, the Q2 lynx signs of presence recorded increased only slightly compared to the previous 5-year-period (Table 2). The number of Q2 data decreased from 15 in 1995 to 9 in 1999. Besides, in all the 15 years of lynx presence we were unable to document reproduction. The scarcity of lynx was underlined by the fact that in over 850 trap-nights no lynx photo was taken. However, the photo-trap-sessions had to be interrupted early because several photo-traps were stolen. Nevertheless, we were able to confirm a new lynx occurrence to the west of the Tarvisiano in the Province of Belluno, where 13 Q2 data were reported. These Q2 data are situated mainly in the east of the Province, whereas in the previous pentad some data had been collected in the west, close to the Trentino occurrence. There, the lynx occurrence has probably gone extinct, as during the past pentad only 4 Q2 data were recorded close to the Belluno occurrence. From 1996 to 1998, lynx signs of presence were reported from the province of Bolzano. But none of the reports was confirmed by an expert.

#### Western Italian Alps

Only scattered data have been collected in the western Alps: Q2 data were reported only from

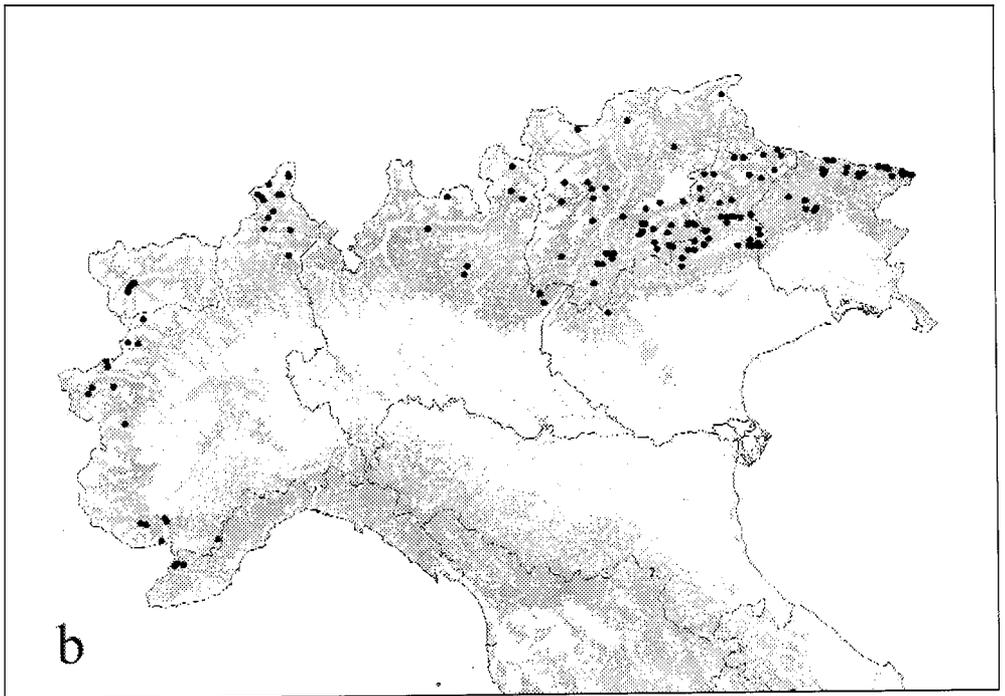
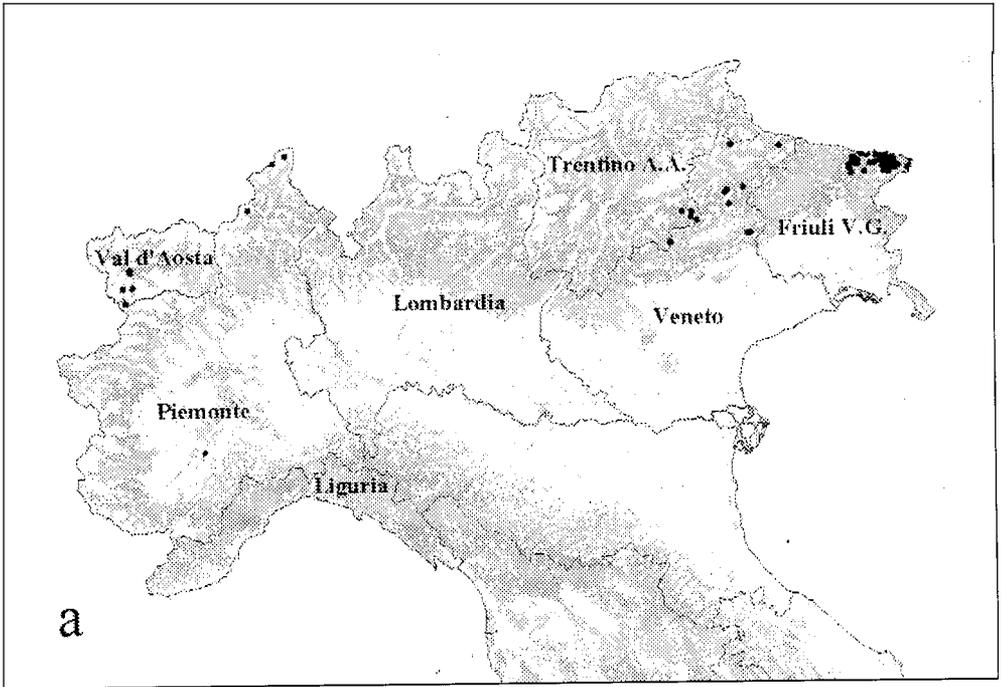


Figure 1 - Distribution of lynx signs of presence in the Italian Alps from 1995 to 1999: a) Quality 2 data; b) Quality 3 data. The forest cover is shown in grey.

Table 2 - Number of quality 1 (Q1), quality 2 (Q2) and quality 3 (Q3) data recorded in the Tarvisiano, an area of 500 km<sup>2</sup> in north-east Italy.

Year	Q1 (photo)	Q2 (tracks)	Q2 (scats)	Q2 (kills)	Q3 (all signs)	Total
1986		2				2
1987		3	1	1		5
1988		6	1	1		8
1989	1	8	2	2		13
1990		10	1	1		12
1991		7	2	3		12
1992		8		3	3	14
1993		5	1	1		7
1994		4		4	2	10
1995		7	1	7	1	16
1996		7		5	3	15
1997		9		3		12
1998		7		3	3	13
1999		7		2	6	15
Total	1	90	9	34	18	154

areas bordering with Switzerland (Val d'Aosta and Val d'Ossola). In the Val d'Aosta, 5 kills (Q2 signs) were reported in 1999 from the Gran Paradiso National Park. Before that, only direct observations (Q3 signs) were recorded for this area. In the Val d'Ossola, Q3 data had been reported since 1988, but only during the past pentad the presence of lynx was confirmed by Q2 data. Some signs of lynx presence of Q3 were reported from western Piemonte and even Liguria.

#### DISCUSSION

In Italy, lynx still have not established a vital population even though suitable habitat is available from the south-western through to the eastern Alps. With the exception of the new occurrence in the province of Belluno, lynx occur only in areas bordering with Slovenia and Switzerland, where vital populations exist. In the Tarvisiano, a sharp decrease in the number of Q2 data was observed from 1998 that peaked in 2000, when only 3 Q2 observations were reported. During the winter 1999/2000 no kills were recorded for the first time since 1986. From January to May 2001, however, 7 Q2 signs and even 1 Q1 sign were collected. The

same trend was observed in the Slovenian Alps (Stanisa *et al.*, this volume). We conclude that only few individuals are present in the Tarvisiano and that a death or emigration of only one lynx can change already the trend observed. Based on known home range size of lynx in the Alps (Haller and Breitenmoser, 1986; Haller, 1992) and the extension of the area occupied, we estimated the number of lynx in the Tarvisiano to be 3-4 individuals.

The new occurrence in the Province of Belluno might be due to (1) a shift from the Trentino, where lynx have disappeared or (2) an immigration of individuals from the east (Tarvisiano/Slovenia). Due to the absence of confirmed data between the Belluno and Tarvisiano (Fig. 1a), the two hypotheses can only be tested in the future, when the monitoring effort is increased in this area. It is a fact that no reproduction was ever reported and Q1 data is very scarce, as only 12 years after the first photo taken in 1989, the lynx presence was confirmed by Q1 with a second photo taken in 2001. If the lynx occurrence in Belluno is due to a westward expansion of the Slovenian source population, it is very

likely that reproduction has occurred in Italy without it being detected.

We consider the lynx occurrence in Trentino as extinct, as there are no reports of Q2 signs in the area of the former lynx presence. The only Q2 signs in the Trentino region originate close to the new Belluno occurrence. At the 1<sup>st</sup> SCALP conference in 1995, this population was estimated to consist of more than 20 individuals, expanding into the provinces of Belluno and Bolzano (Ragni *et al.*, 1998). However, the 6 observed reproductions have never been validated by objective data. In the light of our new data, applying the Scalp standard, the Trentino population needs to be interpreted more conservatively, as even in the presence of poaching a population of 20 reproducing individuals is unlikely to disappear within such a short time period.

In the western Italian Alps, both the Val d'Aosta and Ossola are connected by several passes to the Canton of Valais (Switzerland) where lynx have been present for 25 years. But the scarcity of Q2 data reported from the Val d'Aosta and Ossola suggest that these data are due to single individuals only. However, the recent confirmation of lynx presence in the Val d'Ossola may only be due to an improvement of the monitoring, as signs of lynx presence (Q3) have been reported in this area since 1988.

For the analysis of lynx distribution we considered only Q2 data. Q3 data were more or less scattered from the south-western to the north-eastern Alps. Such a wide distribution would represent a vital population that should definitely produce hard fact data (Q1) such as lynx mortalities. The absence of Q2 data in the region of Lombardia, western Piemonte and Liguria stresses the need to expand the network of lynx experts to these areas. Only a systematic monitoring will provide a realistic distribution map. Any other approach can lead to severe management problems before lynx even occur in the area concerned. The responsible GOs have therefore established monitoring guidelines on anational level (Molinari *et al.*, in press). In Italy, lynx suffer from two main problems: (1) clandestine re-introduction projects and (2) illegal killings. This clandestine management

has to be stopped because it is counterproductive both in the eyes of hunters and farmers as well as conservationists. A consensus can only be found if GOs and NGOs base any decision on scientific knowledge. Italy plays an important role for the future of the lynx in the Alps, as its territory connects the two vital populations from Slovenia and Switzerland. Since the immigration from these two countries is rather slow, the quickest way to establish a vital Italian population would be to translocate lynx. Nevertheless, such a process needs time, as it cannot be carried out without the consent of hunters and sheep breeders. Priority should be given to the expansion of the existing occurrences. The monitoring has to be guaranteed to detect any changes in dynamics. Radio-tracking of lynx would be a useful way to assess the expansion of the Italian occurrences and to better estimate bias in our monitoring system.

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#### RIASSUNTO

Per analizzare lo status e la distribuzione della lince (*Lynx lynx*) nelle Alpi italiane dal 1995

al 1999, tutti i segni di presenza rinvenuti sono stati raccolti, valutati ed interpretati con un metodo standardizzato. Sono stati distinti tre livelli di attendibilità in accordo con le linee guida della SCALP (*Status and Conservation of Alpine Lynx Population*) e la possibilità di verificare i dati raccolti: Qualith 1 (Q1), rappresenta i dati oggettivi e certamente dimostrabili, come per es. quelli riguardanti linci abbattute, rinvenute morte o fotografate e videoregistrate (con sfondi riconoscibili e verificabili); Qualith 2 (Q2), rappresenta i segni riguardanti le predazioni di animali selvatici e/o domestici, le tracce e le fatte valutate e confermate da persone e/o personale competente (guardiaparchi, guardiacaccia, guardie forestali) che hanno frequentato corsi specialistici sul riconoscimento di questi segni; Qualith 3 (Q3) - raccoglie invece tutti gli altri segni di presenza rinvenuti da persone generiche o non specializzate, come pure tutti i segni non verificabili, in particolare le osservazioni dirette e le vocalizzazioni. Nelle Alpi italiane nel periodo in questione sono stati raccolti 261 segni di presenza della lince, dei quali 85 sono Q2, i rimanenti Q3, mentre non è stato possibile raccogliere nessun dato Q1. I dati Q2 provengono da quattro differenti areali confinati, mentre quelli Q3 sono distribuiti in tutto l'arco alpino italiano. Si può riassumere la dinamica dell'ultimo quinquennio nelle Alpi italiane in quattro eventi principali: (1) il trend positivo osservato nel nord-est in Friuli V.G. (nel Tarvisiano) sino al 1995 è sensibilmente calato, ma (2) nello stesso tempo è stato osservato un incremento nel numero di dati raccolti nel nord-est del Veneto (Provincia di Belluno). In sostanza, nelle Alpi sud-orientali è stato raccolto un numero superiore di dati distribuiti in un areale di maggiori dimensioni rispetto al quinquennio precedente. (3) Le linci presenti in Trentino, di origine sconosciuta, sono nuovamente scomparse. Ed infine (4), la presenza sospettata in Val d'Aosta e nel Piemonte più settentrionale (Val d'Ossola) è stata confermata da dati Q2. I risultati indicano come ad oggi in Italia la lince non ha potuto ancora dar vi-

ta ad una popolazione vitale pur in presenza di un ambiente favorevole dalle Alpi sud-occidentali a quelle sud-orientali. A parte l'eccezione della nuova presenza del felide in Provincia di Belluno, la lince compare solo nelle aree di confine con la Slovenia e la Svizzera, dove vivono due distinte popolazioni vitali. L'Italia giocherà un importantissimo ruolo per il futuro della specie nelle Alpi, dato che i suoi territori connettono le due popolazioni che vivono in Slovenia ed in Svizzera.

## REFERENCES

- Haller, H. and Breitenmoser, U., 1986. Zur Raumorganisation der in den Schweizer Alpen wiederangesiedelten Population des Luchses (*Lynx lynx*). Zeitschrift für Säugetierkunde, 51: 289-311.
- Haller, H., 1992. Zur Ökologie des Luchses im Verlauf seiner Wiederansiedlung in den Walliser Alpen. Mammalia depicta: 1-62.
- Molinari, P., 1998. The lynx in the Italian South-eastern Alps. Hystrix 10: 55-64.
- Molinari, P., Breitenmoser, U., Molinari-Jobin, A. and Giacometti, M., 2000. Predatori in azione: Manuale di identificazione delle predazioni e di altri segni di presenza dei grandi mammiferi carnivori. Rotografica, Limena: 1-124.
- Molinari, P., Molinari-Jobin, A. and Breitenmoser, U., in press. Progetto di monitoraggio dello stato di conservazione di alcuni mammiferi particolarmente a rischio della fauna italiana: la lince eurasiatica *Lynx lynx*. Dipartimento di Biologia Evolutiva - Università degli Studi di Siena, Servizio Conservazione Natura - Ministero dell'Ambiente.
- Ragni, B., Possenti, M., Mayr, S., Carrer, M., Zangrando, E., Catello, M., Dorigatti, E., Di Lorenzo, M., Mosca, A., Fattor, M. and Lombardi, G., 1998. The lynx in the Italian Alps. Hystrix 10: 31-38.
- Stanisa, C., Koren, I. and Adamic, M., this volume. Situation and distribution of the lynx (*Lynx lynx* L.) in Slovenia from 1995-1999.