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THE SITUATION OF THE LYNX (*LYNX LYNX*) IN AUSTRIA

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ABSTRACT - Nine wild lynx were translocated from the Carpathian Mountains to Styria between 1977 and 1979 in order to re-introduce this species into the Austrian Alps. Field projects continued until 1982, when monitoring of the released animals ceased. After five years the lynx had spread as far as 120 km from the site of re-introduction, but observations were few and seldom confirmed. Only in the district of Carinthia, where lynx activity was strongest, did the hunters' association gather data by means of observation report forms. Lynx reports became scarce during the 1980s, and re-introduction seemed to have failed, when in 1989 a series of sheep kills by lynx in Carinthia re-activated the interest of the public in the lynx, and more observations were reported. The Carinthian Hunters' Association formed a lynx group to verify these reports. More intensive training of the members of the group since 1992 has revealed that much of the information collected was not valid proof of lynx presence. There is no established lynx population in the Austrian Alps at present. The most regular and reliable observations come from the original region of the releases and from southern Carinthia, where lynx immigrating from Slovenia may sustain the Austrian population.

Key-words: *Lynx lynx*, re-introduction, status, distribution, depredation, Austria, Alps

INTRODUCTION

The lynx (*Lynx lynx*) was eradicated in the eastern Alps during the second half of the 19th century. The last evidence of its presence came from the Caravanche Alps, from the Carnic and the Gurktal Alps, and from the Central Alps of Tyrol (Eiberle 1972, Polacsek 1978). In the western Alps, the decline of wild ungulate populations forced the predator to kill livestock, and this finally led to the extinction of the predator. The situation was different in the eastern part of the Austrian Alps. Here the great landlords maintained wild ungulate populations in high densities for hunting. The lynx was regarded as a competitor and consequently exterminated.

About 100 years after its disappearance the lynx has returned to the Austrian Alps. Between 1977 and 1979 a total of nine lynx (six males, three females) were released in Turrach, district of Styria (Festetics 1980). In the following years, interest in the fate of

the re-introduced lynx has fluctuated among both the public and the scientific community. Hunters and farmers opposed the re-introduction of the lynx, whereas the project was received positively by the rest of the people and the media (Anderluh 1982). The negative attitude towards the lynx among hunters reached a climax in 1979/80, when lynx moved into Carinthia, where they killed large numbers of roe deer in small and locally owned hunting grounds. After all scientific activities ended in 1982, the interest of the public in the lynx soon dwindled. There was no ongoing monitoring of the development of the lynx population with the exception of some random observations gathered by the hunters' association.

The re-introduced feline was no longer a public theme during the 1980s, but it suddenly attracted interest again when, in 1989, lynx were accused of having killed a considerable number of sheep (Table 1) in Carinthia. The Carinthian Hunters' Associa-

tion - aware that the status of the lynx was not known - founded a 'lynx group' and started to train collaborators to recognise lynx signs. In addition, public relations on lynx were improved. In this paper, we summarise experiences with this new monitoring system and review the present status of the lynx in Austria.

DATA AVAILABLE AND METHODS APPLIED

Translocation and survey of the population. The re-introduction of the lynx to Austria took place in several steps (Festetics et al. 1980). The lynx were wild-caught animals from the Slovakian Carpathian Mountains, which came to Styria via Ostrava Zoo. The first two lynx were released on 17.07.1977, after they had been kept in an enclosure to enable them to adapt to the new environment during seven months. A second pair was set free on 24.09.1977, after an acclimatisation period of four weeks. Another two male lynx were released on 28.03.1978. Three more lynx were translocated, but further information about them is not available. After these releases, the project team monitored the movements of the first two pairs of lynx by means of radio-telemetry during several months (Von Berg et al. 1980). In the winters of 1977-79, additional information was obtained by snow-tracking (Sommerlatte et al. 1980, Festetics 1981). In an adjacent hunting ground in Carinthia, a field project investigating the activity and predation of lynx in winter continued until 1982 (Honsig-Erlenburg 1984, Gossow and Honsig-Erlenburg 1985).

In subsequent years, the only data gathered were observations by hunters. The Carinthian Hunters' Association handed out lynx observation forms, in order to gain some information on the presence of lynx, at least for this district. The forms were generally completed by hunters and collected at the office of the Carinthian Hunters' Associa-

tion. The forms denoted the date, location (often not very precisely), and type of observation (kills, lynx sightings, or tracks). No further details were recorded, and none of these observations were confirmed by trained staff. Consequently, the reliability of these records remains uncertain, and at best they outline the tendency of lynx movements. Styria was the only other district beside Carinthia, in which lynx observations have been collected for at least several years after the re-introduction. They were compiled by hunters, but these sparse data do not allow a systematic analysis. New and more detailed forms were established for reporting lynx occurrence in Carinthia in 1990, and random verification of these observations was introduced. The aim was to enhance the quality of the data, and we can now present a more authentic picture of the lynx distribution in Carinthia.

Legal situation and compensation of losses to livestock. The lynx is included in Austrian hunting law. In hunting laws of the districts (Bundesländer), the lynx is listed as a species with a year-round closed season. Hunting licences can be issued by district authorities, but have so far never been requested. So far, one illegal shooting of a lynx is known to have occurred in Carinthia in 1980. There is no evidence of further illegal killings although some are probable. Compensation for livestock killed by lynx is regulated separately in each district. In Carinthia and Styria, depredation by lynx (as well as by brown bear) is indemnified through an insurance sponsored by the hunters' associations. To verify cases of depredation in Carinthia, members of the hunters' lynx group have been instructed in special courses organised by the hunters' association. In Styria, a similar group is currently being formed; in other districts there have been no cases of depredation by lynx so far. If they occur, compensation will be provided from a variety of special funds.

EVOLUTION AND PRESENT STATUS OF THE LYNX POPULATION

Distribution of lynx records in Austria up to 1982.

Initially, all lynx remained close to the release site. In the second year of the re-introduction, they covered an area of some 580 km², and the number of observations in the central area decreased. In the fourth year, the area had expanded to 1000 km², and in the sixth year to at least 5000 km² (Festetics 1981). The animals had dispersed into different directions, up to 120 km from the release site (Fig. 1). However, observations ceased again in the distant areas newly occupied, with the exception of Carinthia where lynx observations continued. Nevertheless, the general pattern of lynx distribution in the eastern Alps in the early 1980s was that of a scattered individuals rather than an established population (Gossow and Honsig-Erlenburg 1986).

Distribution of lynx observations in Carinthia 1983-89.

After 1983, lynx records were only systematically collected in Carinthia (the few records from other districts will be dealt with later). From 1983-85 (Fig. 2a) clusters of observations occurred in the Gurktaler Alpen. Most records originated from central and upper Carinthia, mainly the northern Gailtaler Alpen. In 1986-88 (Fig. 2b) most observations were concentrated in central and south-western Carinthia. Clusters were apparent in the south-western Nockgebiet (including the north- to south-eastern part of the Gailtaler Alpen), the Karnische Alpen and the southern part of the Koralpe (where a series of 28 sheep were killed in 1987; Table 1, Fig. 2b). Additional but isolated observations were made in the Hohe Tauern, the Gurktaler Alpen and the Karawanken (Fig. 2b). In 1989, suddenly a large number of sheep were reported to be killed by lynx (Table 1),

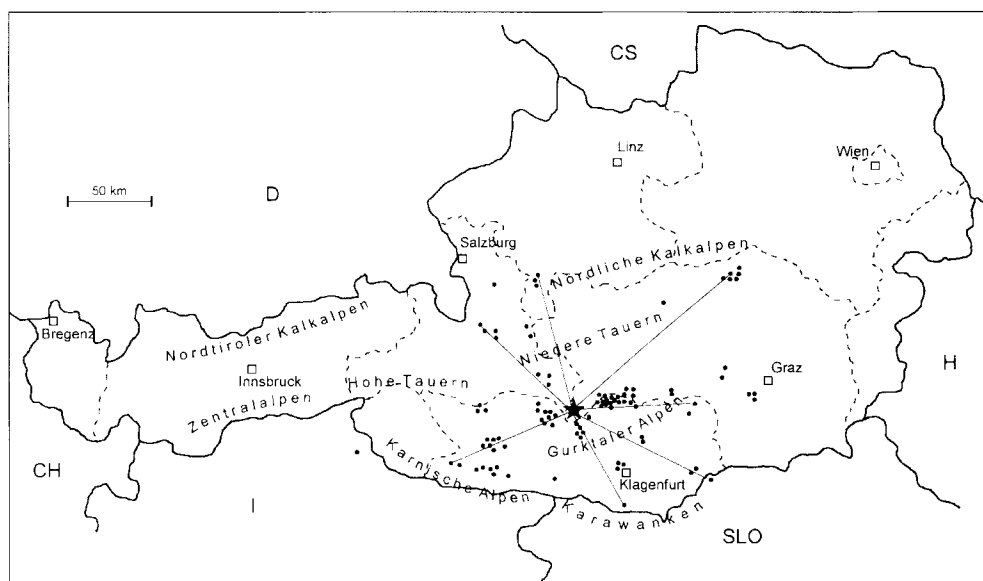


Figure 1. Distribution of lynx observations (dots) in Austria until 1982 after the re-introduction of 1977-79 in Styria (star; after Honsig-Erlenburg 1984). Lynx were spreading concentrically from the release site up to a distance of 120 km (lines). Broken lines represent district boundaries (see Fig. 4 for district names), open squares are district capitals.

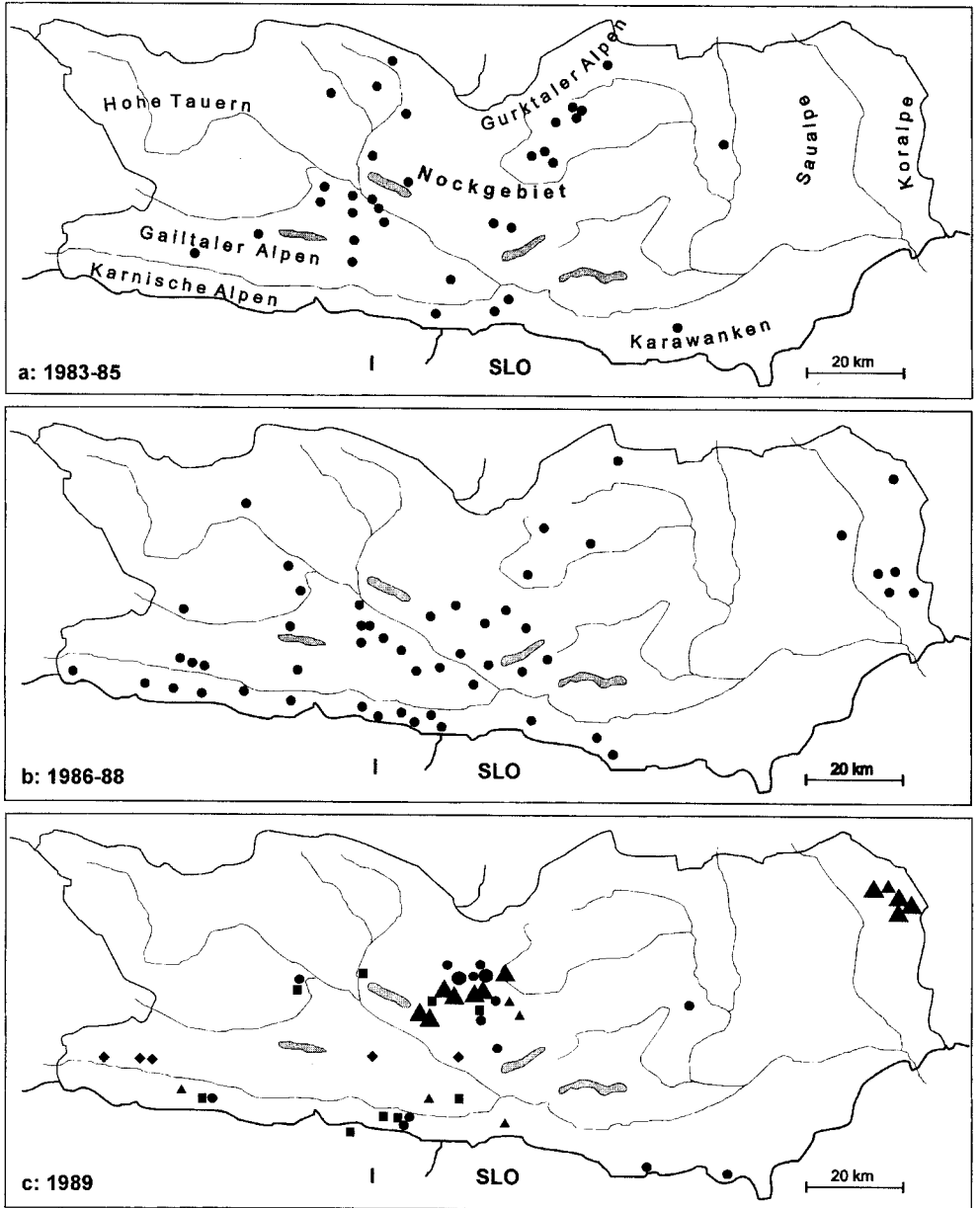


Figure 2. Distribution of lynx observations in Carinthia (Austria). (a) 1983-85, (b) 1986-88, and (c) in 1989. In (a) and (b), dots mark all types of observations. For (c), dots represent kills of wildlife, triangles sheep killed (small triangles: 1-2, medium triangles 3-4, large triangles >5 kills), diamonds lynx tracks found, and squares sightings of lynx. Rivers are shown as thin lines, lakes as grey polygons.

mainly in the Nockgebiet and in the northern part of the Koralpe (Fig. 2c). Further

observations were again reported from the Karnische Alpen and the Gailtaler Alpen, as

Table 1. Reports of livestock killed by lynx and compensation paid in Carinthia (Austria) during 1983-95.

Year	Number of		Compensation (ÖS)	Remarks
	events	kills		
1983	4	7	-	7 sheep
1987	7	28	-	28 sheep
1988	2	5	-	5 sheep
1989	25	60	128'155	48 sheep, 10 lambs, 1 calf, 1 goat
1990	8	20	41'700	15 sheep, 4 lambs, 1 calf
1991	6	9	27'300	1 sheep, 6 lambs, 1 cattle ^b , 1 calf
1992	4	4	10'500	3 sheep, 1 calf
1993	1	1	2'500	1 sheep
1994	2	2	4'000	1 sheep, 1 lamb
1995 ^a	4	4	7'500	3 sheep, 1 lamb
Total	50	96	221'655	

^a data from January-September only

^b not confirmed as a lynx kill

well as from the Karawanken (Fig. 2c). In conclusion, it is difficult to verify the records from 1983-89, and they can at best give a general outline of lynx distribution. Only the south-western part of Carinthia (Karnische Alpen, Gailtaler Alpen, and - less evident - the Nockgebiet) was constantly occupied. In other regions, observations were reported during one or two years but not thereafter. Moreover, the concentration of livestock depredation in only two small areas is remarkable, and these basically took place within three years (Table 1).

Distribution of lynx observations in Carinthia 1990-95. The sheep kills reported in 1989 initiated new activities. The Carinthian Hunters' Association founded a lynx group, distributed new lynx observation forms, and urged hunters to report lynx observations to members of the group. Articles in newspapers generally renewed public interest. As a consequence, more lynx observations were reported. From 1990-92, a total of 180 observation forms were turned

in (Table 2, Fig. 3a). After a critical review of the material and the elimination of clearly mistaken reports, 138 remained plausible. From the distribution of these data, we can conclude that lynx were present in most mountain chains of Carinthia (Fig. 3a). In search of sites to capture lynx for a telemetry study, we began to check lynx observations from the public. We investigated three tracks, six wildlife kills in the field, and 14 sheep and wildlife kills reported without finding one reliable proof of lynx action. We tried to confirm lynx presence by snow-tracking in winter 1992/93 in the region of the Gailtaler Alpen, where lynx movements had been reported (Fig. 3a). A total of some 500 km of snow-tracking did not produce any positive lynx confirmation. All attempts to capture lynx in large cage-traps (with a total of 361 trapping nights) remained unsuccessful.

This disillusioning experience forced us to re-assess the wide-spread assumption of lynx presence. The conclusion that lynx reports had to be verified carefully also altered

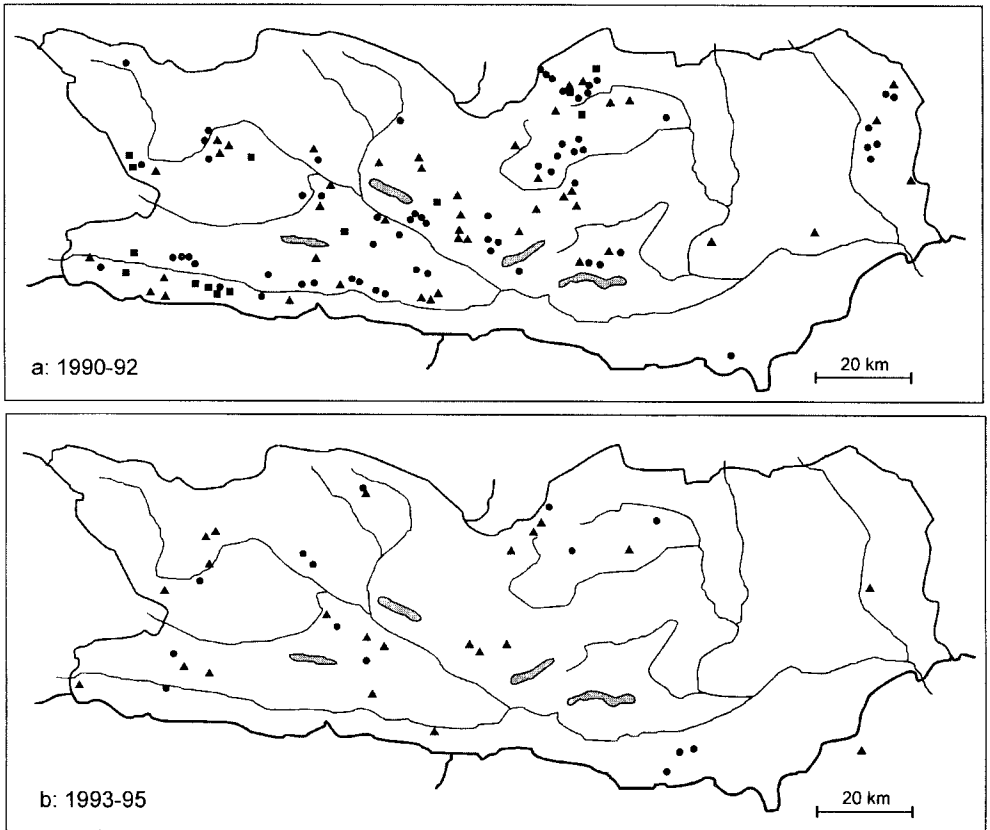


Figure 3. Distribution of lynx observations in Carinthia (Austria) (a) 1990-92 and (b) 1993-95 (September). Triangles stand for lynx sightings, squares for tracks, and dots for kills.

th attitude of the members of the hunters' lynx group. From 1993 to September 1995, only 61 records were reported, of which 45 were considered plausible (Table 2, Fig. 3b). We conclude from these observations that the lynx is constantly present only in the Karnische Alpen, the southern Gailtaler Alpen, and south of the original place of the releases (Gurktaler Alpen; Fig. 4). All other records were either transient and isolated occurrences or unsubstantiated reports.

Reproduction and mortalities. Data on recruitment and mortality are necessary to assess the dynamics of a population. Observations of reproduction are, however, scarce

for the whole of Austria. In the first year after the re-introduction, observations of young lynx were noted and confirmed (A. Festetics, pers. comm.), but further details, such as date, site, or number of kittens are not known. In an adjacent part of the Gurktaler Alpen the presence of young lynx was confirmed by direct observations and tracks up to the early 1980s (P. Honsig-Erlenburg, pers. comm.). Only two more observations substantiate reproduction: (1) in July 1983, a one-year-old lynx was found dead in the Gurktaler Alpen (Metnitztal; individual no. 3 in Table 3 and Fig. 4); (2) in summer 1993, a female lynx with kittens was repeatedly observed in the region of Turrach

Table 2. Lynx observations (sightings, kills, and tracks) collected in Carinthia (Austria) 1983-95 by means of questionnaires distributed by the hunters' association.

Year	Lynx observations reported
1983	35
1984	11
1985	17
1986	24
1987	26
1988	19
1989	50
1990	50
1991	78
1992	52
1993	24
1994	20
1995 ^a	17

^adata from January - September

(Gurktaler Alpen; P. Lieck, pers. comm.). Only four lynx casualties are known from Austria. Three out of the seven animals shown in Table 3 and in Fig. 4 were shot legally in Slovenia close to the Austrian border. The lynx shot in Prevalje (Slovenia, no. 1 in Table 3 and Fig. 4) was identified as one of those released in Austria (J. Cop, pers. comm., A. Festetics, pers. comm.). For the two lynx hunted in the Karawanken in the years 1989 and 1990 (no. 5 and 6), it is not certain whether they came from Austria or from the expanding Slovenian population. The male killed in a traffic accident in Flachau in 1995 (no. 7) was the only known lynx casualty in Austria during the last 12 years to present (Huber 1995b).

Lynx occurrence in other Austrian districts. Styria: After the re-introductions in the district of Styria lynx observations were not recorded systematically. Since October 1993 the Styrian Hunters' Association has distributed observation forms, and a lynx and bear group is being formed to verify ob-

servations reported. During the last three months of 1993 alone 10 observations accumulated. In 1994 there was a total of 52, and from January to August 1995 another 13 unconfirmed observations were registered. Lynx presence had always been confirmed for the region of its re-introduction in the Gurktaler Alpen. Another constantly occupied region is the southern part of the Korralpe close to the Slovenian border (Fig. 4). Reliable observations were also reported from other parts of the district but they all remained isolated and need further evaluation to allow a more conclusive assessment on the situation of the lynx in Styria. A thesis is now being written on this topic (G. Majcen, pers. comm.).

Salzburg: Valid observations were reported from the south-eastern district of Salzburg, adjacent to the lynx area in the Gurktaler Alpen (Styria). In February 1995, a male lynx was killed on the highway near Flachau (no. 7 in Table 3 and Fig. 4). Observations made in the area bordering Bavaria (Germany) and in the Pinzgau have not been confirmed. However, a credible sighting of a lynx made in August 1995 near the Hochkönig (20 km south of the border to Germany) suggests lynx presence in the northern Salzburg district.

Eastern Tyrol: None of the few reports have been confirmed so far, although immigration through the Karnische Alpen or the Hohe Tauern (Fig. 4) is possible.

Two regions of lynx presence exist in Austria outside the Alps. One is in Upper Austria, the second in Lower Austria (Fig. 4; Huber 1995a). Both populations originated from the Sumava National Park in the Bohemian Forest (Czech Republic) where a total of 18 lynx were released during 1982-89. This re-introduced population is known to have expanded at least to the border with Austria (Andera and Cerveny 1994; L. Bufka, pers. comm.). Since 1988 infrequent sightings, tracks, and kills have also confirmed lynx presence in the Austrian Mühlviertel (Traummüller, pers. comm.). In the

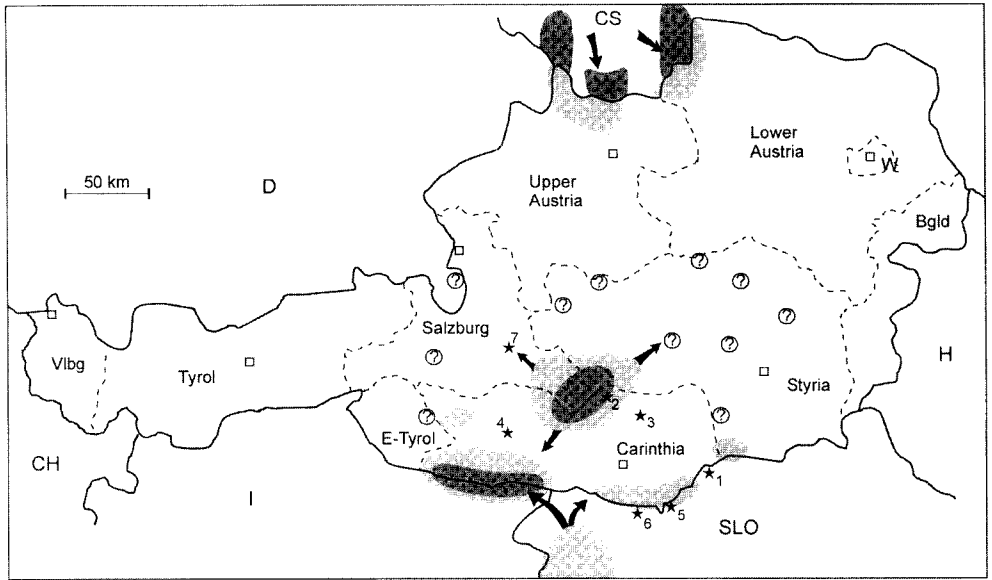


Figure 4. The situation of the lynx in Austria and in bordering areas. Dark grey zones represent areas of regular, light grey zones of infrequent lynx observations. Stars indicate reported cases of lynx mortality (individual no. as in Table 3), question marks are unconfirmed observations. Open squares mark district capitals, broken lines district borders, solid lines international boundaries.

nearby Waldviertel (district of Niederösterreich, Fig. 4), lynx have been reported throughout the last decades. In 1987 and 1988, several lynx kills were found (Forstner 1988). Lynx are still present in the Waldviertel today (M. Forstner, pers. comm.), intruding from the expanding population in the Czech Republic.

DISCUSSION

Reliability of lynx reports. Data collected about the lynx in Austria after its re-introduction were very heterogeneous and continuous records only exist for Carinthia. During a first period of intensive field studies, the situation of the lynx was well documented until the early 1980's. In subse-

Table 3. Lynx mortalities in Austria and in bordering areas, from the first re-introductions in 1977 to present. M = male, F = female. For map locations of all individuals see Fig. 4.

Individual	Year	Sex and age	Cause of death	Location
1	1979	M adult	hunting	Prevalje (SLO)
2	1980	F adult	illegal hunting	Metnitz, Gurktaler Alpen (A)
3	1983	subadult	found dead	Friesach (A)
4	1983	F adult	found dead	Spittal a. d. Drau (A)
5	1989	M adult	hunting	Karawanken (SLO)
6	1990	M adult	hunting	Karawanken, Koschuta (SLO)
7	1995	M adult	traffic accident	Flachau, Radstädter Tauern (A)

quent years, however, the widely dispersed lynx observations (Fig. 1) and the irregular reports from various regions made it impossible to present a realistic distribution of the lynx in Austria. This is especially true for the years 1983-89. One phenomenon was a sudden increase in reported predation during 1987, 1989, and 1990. Sheep were killed in a few places (Nockgebiet, Koralpe; Huber 1991) but only for a short period. Reports of predation decreased again after 1990 (Table 1). We cannot judge whether all sheep were actually killed by lynx, but nevertheless, a temporary peak of livestock depredation and a decline to moderate levels had also been observed in other re-introduced populations (Haller and Breitenmoser 1986).

The fluctuations in the number of observations may also reflect changes in public awareness. The number of records considerably increased from 1990-92, after the Carinthian Hunters' Association had founded a lynx group and encouraged members to report lynx observations. With printed materials, conferences, and pictures, their ability to recognise lynx signs was improved. Nevertheless, they lacked practical experience when they started to examine kills or tracks, which were increasingly reported by people after 1990. This may have led to many erroneous records, but it is impossible to verify this today. The theoretical training of members of the lynx group had at least the effect that they learned how to reproduce an authentic lynx observation.

When starting our field work in Carinthia in 1993, we produced a guide to identify and discriminate predators' kills (Kaczensky and Huber 1994), and we examined possible lynx kills together with members of the lynx group. Discussions on site often disclosed that a first identification of the predator involved had been mistaken. Practical experience was very instructive, and as a result, signs and kills were checked and reported more carefully. The consequence was a reduction of records in 1993-95 (Table 3).

These experiences show that intensified publicity can immediately produce more records but that verification of these observations is often impossible and that increasing the quality of the data is difficult (Kaczensky and Huber 1993).

Status of the lynx in Austria. There has been a surprisingly small number of reported mortalities compared to the re-introduced populations in Switzerland and Slovenia. Three lynx casualties were recorded in Austria in the years after the re-introduction; the next dead lynx was reported only 12 years later. In Switzerland, a total mortality of 103 lynx (57 from the Alps) has been reported since the first re-introduction in 1971 (Breitenmoser et al. 1997). In Slovenia, lynx were re-introduced in 1973 and have been legally hunted since 1978; up to present, a total of 124 individuals were either shot or found dead in Slovenia, and another 153 in Croatia (Cop 1995). Despite these high losses, both countries still have lynx populations. Every established lynx population - especially one existing in a cultivated landscape - will suffer losses. Therefore, comparisons of these three countries with re-introductions at about the same time suggest that in Austria no established lynx population exists at present. This verdict is supported by the fact that confirmed observations of lynx reproduction are missing almost entirely for Austria.

Conclusions. The current system of obtaining information on the status and distribution of the lynx in Austria is inadequate. First, monitoring of the species must be improved. Such a programme should include:

- continued gathering of lynx observations as at present;
- testing a sample of the reported observations;
- monitoring the status of lynx in each wildlife management unit through annual questionnaires;

- additional training for members of lynx groups;
- initiation of annual track counts along test transects to obtain an index of lynx presence, for assessing population trends and be comparisons with other countries or regions;
- co-operation with lynx specialists from Italy and Slovenia in order to establish a super-regional monitoring programme;
- continuing public education to improve acceptance of lynx by hunters and farmers.

We conclude that lynx have not established a viable population in Austria. To achieve this goal, various strategies must be considered, including the renewed release of animals. For southern Austria, the immigration of Slovenian lynx is crucial and should be supported by all means. An important step was to stop the shooting of dispersing lynx in northern Slovenia. Today, the species is only open for hunting in a central area in the south of the country (Cop and Frkovic 1998). A monitoring system should now be established for areas where hunting is prohibited - including, for instance, track counts as proposed for Austria. The re-colonization of the Austrian Alps through lynx immigrating from Slovenia provides another advantage: People tend to accept natural intruders more easily than animals intentionally released. And, as the return of large predators into a cultivated landscape is involved, people's attitudes are crucial, as became evident again when the brown bear (*Ursus arctos*) returned to the Austrian Alps (Rauer 1995).

ACKNOWLEDGEMENTS. The lynx work has been financially supported by the Carinthian Hunters' Association, the Zentralstelle der österreichischen Landesjagdverbände and the Austrian Ministry of Science. The collaboration with the Carinthian hunters was very important. We are

indebted to Gerhard Anderluh, Dietrich Senitz and Walter Kulterer. We acknowledge Prof. Hartmut Gossow from the Institute of Wildlife Biology and Game Management, Agricultural University of Vienna for supervising the lynx project. For data collection we were supported by the Salzburg Hunters' Association (Herman Kristan), the Styrian Hunters' Association (Karl Sirowatka), the Austrian League for Protection of Nature (Hannes Augustin), Christoph Aste, Bernhard Gutleb, Peter Honsig-Erlenburg, Erwin Lick, Gerald Majcen and Paolo Molinari. Last but not least, we thank Urs Breitenmoser and Christine Breitenmoser-Würsten for their help in producing this paper and Anja Jobin for assistance with graphics.

ZUSAMMENFASSUNG

Der Luchs ist in den österreichischen Alpen in der zweiten Hälfte des 19. Jahrhunderts ausgerottet worden. Seine Rückkehr nach 100 Jahren erfolgte durch ein Wiedereinbürgerungsprojekt im Gebiet der Turrach in der Steiermark. In den Jahren 1977-79 wurden 9 Luchse freigelassen. Die ersten vier Tiere wurden kurze Zeit radiotelemetrisch überwacht, gezieltes Ausfahrten im Ausbürgerungsgebiet (Turrach und Flattnitz) dauerte bis 1982. Die Luchse wanderten in verschiedene Richtungen ab (Abb.1). Beobachtungen kamen bis aus 120 km Entfernung. Am konstantesten hielten sich die Nachweise in Kärnten. Nur in diesem Bundesland erfolgte die Aufzeichnung von Luchshinweisen von Anfang an kontinuierlich.

Ab 1980 sammelte die Kärntner Jägerschaft Beobachtungen mittels Meldekarten. Für die Periode 1983-89 (Abb.2 a-c) zeigen diese Meldungen nur einen Trend für die Luchsverbreitung in Kärnten, da die Angaben z.T. sehr dürftig und viele nicht mehr überprüfbar sind. Auffällig sind die räumlich konzentrierten Schafnisse in den Jahren 1987, 1989 und 1990 (Tab.1). Ausgelöst durch die dem Luchs zugeschriebene

hohe Zahl an Schafrissen gründete die Kärntner Jägerschaft eine Luchsgruppe, deren Mitglieder im Erkennen von Luchsnachweisen ausgebildet wurden. Die erhöhte Aktualität der Art führte zu viel mehr Hinweisen. Von 1990 bis 1992 erfolgten 180 Meldungen (Tab.2), von denen 130 als möglich eingestuft wurden - der Luchs schien in weiten Teilen Kärntens verbreitet (Abb.3a). Eine im Winter 1992/93 durchgeführte stichprobenartige Kontrolle der Meldungen brachte jedoch keine konkreten Hinweise auf Luchs. Bei den meisten Fällen handelte es sich um Fuchs oder Hund. 1993-95 gingen die Meldungen zurück und die Hinweise verteilten sich auf die Karnischen, die Gailtaler und die Gurktaler Alpen, die Hohen Tauern und die Karawanken (Abb.3b).

In der angrenzenden Steiermark treten Luchse regelmässig im Aussetzungsgebiet in den Gurktaler Alpen und im südlichen Teil der Koralpe an der Grenze zu Slowenien auf (Abb.4). In Salzburg kann die Anwesenheit des Luchses im Südosten des Landes (Lungau) zusammenhängend mit dem Vorkommen in den Gurktaler Alpen bestätigt werden. Aus Osttirol gibt es einzelne Hinweise. Bisher fehlt jedoch eine sichere Bestätigung der Anwesenheit des Luchses. Ohne gut geschulte Personen sind nicht überprüfte Luchshinweise immer mit Skepsis zu bewerten. Im Gegensatz zu den ebenfalls wiederangesiedelten Populationen in Slowenien und der Schweiz sind in Österreich Nachweise erfolgreicher Fortpflanzung und Totfunde äusserst spärlich (Tab.3, Abb.4). All diese Befunde lassen den Schluss zu, dass in Österreich derzeit keine etablierte Luchspopulation existiert. Für die Zukunft braucht es ein landesweites und sogar länderübergreifendes Monitoring-System zur besseren Erfassung des Status und der Verbreitung des Luchses in Österreich und den angrenzenden Gebieten in Italien und Slowenien. Die derzeitige Situation muss dringend verbessert werden, da die vorhandenen einzelnen Luchse

das langfristige Überleben der Art in Österreich nicht garantieren können.

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