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LYNX DISTRIBUTION IN THE FRENCH ALPS (1995-1999)

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ABSTRACT - From 1995 to 1999, 69 data were recorded on lynx presence in the French Alps, in an area of 3,636 km². Lynx presence was recorded in the major forested regions of the pré-Alpes (Chablais, Glière/Aravis, Bauges, Chartreuse, Vercors, Diois/Beauchène), in the Chamonix and Maurienne valleys and the Briançon region, but no large continuous area of presence was shown. Lynx have probably been permanently present in certain locations during the past years, but the presence of a large lynx population in the Alps is improbable in the northern French Alps. In the future, we recommend that habitat suitability for lynx in the northern French-Alps should be assessed, together with possibilities of connection between alpine regions and possible bias in the monitoring system.

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

INTRODUCTION

At the onset of the 20th century, after a long period of decline, the Eurasian lynx *Lynx lynx* had become virtually extinct in France, like in most other West European countries. Nowadays, the species is slowly recovering in some parts of its previous range. In France, the lynx has expanded its range in the Jura and in the Vosges (Stahl *et al.* 2000,2401). In the 1970's, lynx have also spread towards the French Alps from Switzerland, where at least 14 individuals had been reintroduced (Breitenmoser *et al.*, 1998). The 1974-1997 lynx distribution survey in the French Alps (Stahl and Vandel, 1998) showed a southward expansion of about 200 km, but no continuous distribution area, and most data were scattered and collected in distant places. At that time, this distribution pattern was partly explained by an insufficient observation effort in the French Alps (Stahl and Vandel, 1998). At the first Conference on the Status and Conservation of the Alpine Lynx Population (SCALP) in Engelberg (Council of Europe, 1998), the need for more careful monitoring of lynx populations was emphasised. Over the last five years we have tried to make such an effort in France. In this paper, we will give a short overview of the present-day knowledge of the status (1995-1999) of the lynx in the French Alps and make a few comments on the future of lynx management in that region.

LYNX MONITORING IN FRANCE

In France, monitoring of the lynx population and census of livestock losses have been entrusted to the "Office national de la chasse et de la faune sauvage" (ONCFS), the national game and wildlife agency of the Ministry of Environment. Data are collected with the help of a permanent Large Carnivore Expert Group (LCEG). The LCEG has two main objectives: (i) to investigate all livestock predation events, to enable payments of compensation for lynx-caused damages and (ii) to collect and verify signs of lynx presence (tracks, prey remains, sightings, scats) useful for monitoring the changes in its distribution. In each administrative unit of some 5000 km² (called "département" in France), 30-60 local lynx-experts are permanent members of LCEG. Most experts are agents of wildlife or forestry public agencies, or national parks. These people have attended a training course and are able to identify lynx signs. They investigate each case of domestic livestock predation. They may search for other lynx signs in the field (tracks, prey remains), but their main

Table 1 - Lynx presence data collected in the French Alps over the last ten years (hard facts: captures, dead lynx, photos); confirmed observations: livestock kills, wildlife kills, tracks, scats, hair, confirmed by a lynx-expert, sightings made by lynx-experts; unconfirmed observations: livestock kills, wildlife kills, tracks, scats, hair, single footprints, sightings or calls, for which lynx-experts consider that they are "probable" lynx signs.

Categories	1990-1994	1995-1999	total
hard facts	2	0	2
confirmed observations	5	7	12
unconfirmed observations	24	62	86
TOTAL	31	69	100

activity is to collect and verify all information reported by hunters, foresters, shepherds or the general public. Each category of field sign is noted on a special form. Objective and standardised identification and reliability assessment criteria have been defined for each category of field sign (Vandel and Stahl, 1998). Data are collected in each "département" and then transmitted and analysed at the national level by ONCFS. For range estimates, each data point is centred within a 3 km x 3 km square. At such a small-scale, we are only interested in presence-absence data in each grid. Lynx "presence" in a grid is extended to the nine surrounding grids (i.e. a total of 8,100 ha for each data or 1/2 to 1/3 of an average lynx home range). Range estimates are obtained by summing occupied grids. This method is less susceptible to the effects of outliers and does not include non-used areas. Nevertheless, the range estimates are very conservative.

LYNX DISTRIBUTION

The number of data points increased from 31 in 1990-94 to 69 in 1995-1999 (Table 1). During the same periods, the total cumulative area increased from 1,215 km² to 3,636 km². This expansion was partly due to the greater number of lynx-experts available after the new training sessions, which had been organised in accordance with the Engelberg symposium's recommendations. Confirmed signs of lynx presence were obtained in all major forested regions of the pré-Alpes (Chablais, Glière/Aravis, Bauges, Chartreuse, Vercors, Diois/Beauchène). To the East, in alpine valleys, lynx presence was recorded in the Chamonix and Maurienne valleys, and the Briançon region, but not in Beaufortin nor in the Tarentaise valley (Fig. 1).

In each region, only a few data points were collected and they were rather sparse. Nevertheless, in seven of the 11 more or less isolated areas (Table 2; Fig. 1), lynx signs were recorded in ≥ 3 years of the five-year study period, suggesting a regular presence of lynx. As in 1990-1994, lynx attacks on livestock were only rarely recorded and confirmed.

DISCUSSION

Lynx distribution

All French lynx populations are still vulnerable. Nevertheless, the future of the Jura and Vosges borderland populations does not seem to be so bad (Vandel and Wecker, 1995; Vandel and Stahl, 1998b; Stahl and Vandel, 1999). In the French Alps, the future of the lynx is much more debatable. The reasons for the absence of a large continuous area of presence in the French Alps, despite the more than 20-year presence of individuals, remains unclear. There may be two explanations: (i) the range is under-estimated (i.e. lynx are present but not detected) because of certain habitat characteristics which make the detection of field signs more difficult, or (ii) a large lynx population is actually absent.

Our simple presence-absence methodology

Table 2 - Number of data collected and number or years with signs of lynx presence in the main forested areas of the northern French **Alps.**

Region (identification number: see map)	Number of records	Number of years with records
Chablais (1)	6	4
Chamonix valley (2)	4	3
Glières/Aravis (3)	5	3
Salève (4)	4	2
Bauges (5)	3	2
Haute Maurienne (6)	5	2
Basse Maurienne/Belledonne/Taillefer (7)	17	5
Chartreuse (8)	7	3
Vercors (9)	6	3
Diois/Beauchêne/Devoluy (10)	7	5
Briançonnais (11)	5	2

with a network of more or less evenly distributed observers is a good way to collect large files of data on extensive areas. It is efficient even in the absence of permanent snow cover (i.e. most part of the lynx range in France) because we use several sources of information. In the Jura, we observed that the presence of every radio-tracked lynx was detected more than once a year by the LCEG members (ONCFS, unpublished data). In French alpine habitats, we believe that the "presence" of a lynx is much more difficult to prove than in the Vosges and Jura, and we are never sure that "no data" is equivalent to "no presence" of lynx. The low detectability of lynx signs in the French Alps was suspected in some places (e.g. Glière/Aravais) where confirmed signs of presence were obtained after several years of suspected presence. The frequent scavenging of lynx killed livestock or wildlife carcass by corvids, foxes, wild boars and more recently the appearance of wolves in the Alps also makes it more difficult to find and identify lynx prey. Finally, because of low human density and the irregular frequentation of potential lynx habitats by man, e.g. forested slopes, lynx signs also are not easy to find. For all these reasons, we believe that the presence of lynx in the Alps has been underestimated.

Even if the true lynx range was underestimated, the presence of a large lynx population in the Alps is still improbable. The last dead lynx was found in the Alps in 1990, contrary to the Vosges and Jura where cases of mortality have been registered more constantly (Stahl and Vandel, 1999). From a biological point of view, the irregular findings of lynx signs in the major regions probably was not just related to a permanent immigration-extinction process. Immigration from the Jura remains hypothetical despite the proximity of the southern part of the large Jura lynx range: very few data have been collected in the nearest pre-alpine regions of Chartreuse and Bauges. The same is true for the Chablais area, which borders Switzerland. Thus, we believe that in the past years, lynx have been permanently present in the French Alps, but in certain limited locations, e.g. the Glière/Aravis region, the Taillefer region and the Diois/Beauchêne/Devoluy region.

Future of the lynx

In the French Alps, nothing indicates an "abnormal" illegal killing rate of lynx to explain the lynx population's stagnation. In the future, the northern French-Alps habitat's suitability for lynx should be assessed more carefully. In the northern French Alpine valleys, the marked linearity of the forested habitats, surrounded

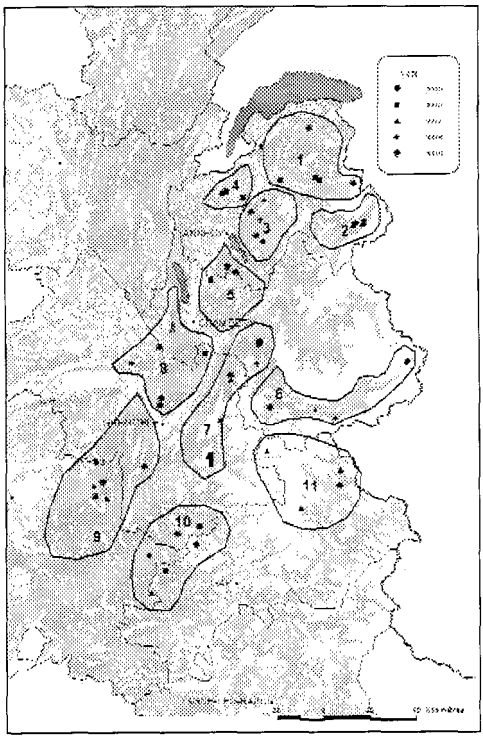

Figure 1 -Distribution of lynx signs collected from 1995 to 1999 in the French **Alps.** The main forested areas numbered 1 to 11 refer to Table 2.

by extensive high-alpine regions and urbanised areas may represent strong ecological constraints preventing the development of a lynx population. The northern pre-alpine regions, where immigration from Switzerland and the Jura could have taken place, are also more or less small, isolated areas. Radio-tracking of lynx would be a useful way to assess the possibilities of connection between alpine regions and to better estimate bias in our monitoring system. Since the large existing populations are probably immigrating into the French Alps at a rather low rate, the best way to establish a viable lynx population in the French Alps would be to reintroduce lynx in favourable sites. The most favourable habitats are probably situated in the southern Alps and pre-Alps, where roe deer populations have recently been increasing and where large inter-connected forested areas exist. Nevertheless, such a process cannot be applied without the consent of hunters and shepherds. The recent spread of the wolf in the French Alps, and the large wolf-livestock conflicts, which have not been solved yet, offer little opportunity to promote such lynx reintroduction in the next future.

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RESUME

De 1990 à 1995, 69 données ont été recueilli sur la présence du lynx dans les Alpes, sur une surface totale de 3636 km². La presence du lynx a été notée dans les principaux massifs forestiers des pré-alpes (Chablais, Glière/Aravis, Bauges, Chartreuse, Vercors, Diois/Beauchène), dans les vallées de Chamonix et de la Maurienne et dans la région de Briançon, mais aucune vaste aire continue de présence n'a été observée. Le lynx a probablement été présent de manière permanente sur certains massifs des Alpes du nord françaises au cours des dernibres années, mais l'existence d'une population importante de lynx est improbable. A l'avenir, il serait important d'estimer les potentialités de l'habitat pour le lynx dans les Alpes du nord, de mesurer les possibilités d'échanges entre régions alpines et de mieux connaître les biais du système de monitoring.

REFERENCES

Breitenmoser, U., Breitenmoser-Wursten, Ch. and Capt, S., 1998. Re-introduction and present status of the lynx *(Lynx lynx)* in Switzerland. Hystrix, 10(1): 17-30.

Council of Europe, 1998. The re-introduction of the lynx into the Alps. Proceedings of the 1st SCALP Conference, Engelberg, Switzerland, 7-9 December 1995. Environmental encounters, 38: 1-157.

Stahl, P. and Vandel, J.M., 1998. Distribution of the lynx in the French Alps. Hystrix, 10(1): 3-15.

Stahl. P. and Vandel, J.M., 1999. Mortalité et

captures de lynx (*Lynx lynx*) en France (1974-1998). Mammalia, 63: 49-59.

Stahl, P., Vandel, J.M. and Migot, P., 2000. La reintroduction du lynx dans le massif vosgien. Le courrier de la nature, 182: 25-27.

Stahl, P., Vandel, J.M., Herrenschmidt, V. and Migot, P., 2001. Predation on livestock by an expanding reintroduced lynx population: long term trend and spatial variability. Journal of Applied Ecology, 38: 674-687.

Vandel, J.M., and Wecker, F., 1995. Présence actuelle du Lynx (*Lynx lynx*) dans le massif des Vosges du Nord (France) et le Palatinat (Allemagne). Ciconia, 19: 133-144.

Vandel, J.M. and Stahl, P., 1998. Lynx (*Lynx lynx*) population monitoring in France: comments on a method of data collection applied over a 6-year period. Environmental encounters, 38: 97-104.