

Recent biogeographical and ecological studies on otter *Lutra lutra* and European mink *Mustela lutreola* in France

Zur rezenten biogeographischen und ökologischen Forschung über den Fischotter *Lutra lutra* und den Europäischen Nerz *Mustela lutreola* in Frankreich

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Abstract: Otter and European mink are two threatened species in France. The mink is even considered to be on the verge of extinction. Studies have been carried out for more than ten years to attempt to understand the changes in their distribution and the ecological needs of these two semi-aquatic mustelids. The results of the research programmes, completed or still under way, are presented. The French Ministry of Environment has set up two specific restoration plans, with the contribution of Conservation Societies for wild fauna and scientific institutions.

Key words: endangered species, *Lutra lutra*, *Mustela lutreola*, biogeography, ecology, conservation.

In France, the otter *Lutra lutra* and the European mink *Mustela lutreola* are of great conservation concern. Both species, in particular the European mink, are in need of urgent and active protection policies (ROSOUX & LIBOIS, 1994; DE BELLEFROID & ROSOUX, 1998; ANON., 1999).

The otter has been the subject of a research programme and protection actions for more than ten years (1986-1998). On the other hand, concerning the European Mink scientific studies really started in 1991 only. The first results were presented at the XVIIth Congress of the French Mammal Society, entitled *La loutre et le vison d'Europe*, in Niort (GAUTIER et al., 1995).

Otter

As far as the otter research programme is concerned, the French Mammal Society, in charge of most of the studies on the ecology and the ethology of the species, has carried out studies and conservation actions throughout the territory. The main conservation strategy aims at protecting the otter in the regions where the populations are healthy (Atlantic wetlands, rivers of Brittany and the Massif Central) and at promoting recolonisation in all suitable areas (ROSOUX & BOUCHARDY, 1990; ROSOUX & LIBOIS, op. cit.).

Studies and research cover the following aspects:

- Field surveys and analysis of the changes in the distribution in France (from 1982 to 2000) (BOUCHARDY, 1984; ROSOUX et al., 1995; ANON., 1999).
- Study on the use of habitat by the otter, throughout the country, by means of direct observation and spraints;
- Ecoethology research programme (diet, use of habitat resources and behaviour, by radiogoniometry techniques) (LIBOIS et al., 1991; LIBOIS, 1995; ROSOUX & LIBOIS, 1996; LIBOIS, 1997; ROSOUX, 1998a)
- Analysis of the causes of death and factors of decline (study of death cases, studies on eco-

toxicology and parasitology) (BOUCHARDY, 1986; ROSOUX & TOURNEBIZE, 1995; TANS et al., 1996; ANON., 1999)

- Recolonisation surveys in various areas of the Massif Central margins and survey of the relictual populations (BOUCHARDY, 1985; ROSOUX et al., 1995)

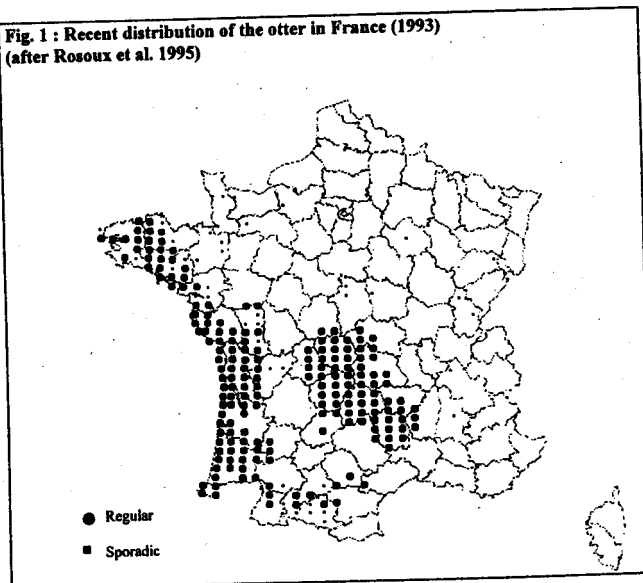
Simultaneously, conservation actions for the otters have been undertaken and include:

- Installation of otter havens and implementation of protection measures (ANON., 1999)
- Critical analysis of the legal protection status of the species, for the Ministry of Environment (LEVY-BRUHL, 1995)
- Evaluation of the public attitude towards the otter (ethnozoological study of the otter in France) (BILLAUD, 1995)
- Public awareness and education programme targeting the otter (ANON., 1999)
- Habitat protection in the framework of the European Union agro-environmental policy (ANON., 1999)

Main results:

At the beginning of the eighties, the otter was present in the departments along the Atlantic coast and in three departments of the Massif Central (BOUCHARDY, 1984). Today, the situation is almost the same on the Atlantic coast while the thriving populations of the Massif Central are expanding mainly to the south and to the east (see fig. 1). A junction between Atlantic and central populations is expected in the years to come. The Pyrenean nucleus is probably in contact with the south-west Atlantic populations. In other regions, relictual populations still remain in Drôme (southern Alps), Ardennes, Morvan (Central France), large lakes in the north-east (Aube); a few individuals still inhabit the Rhône Delta, in Grande Camargue (ROSOUX et al., 1995; ANON., 1999).

Fig. 1 : Recent distribution of the otter in France (1993)
(after Rosoux et al. 1995)



In France, the otter is found in great variety of habitats (ROSOUX, 1998b, ANON., 1999):

- oligotrophic and mesotrophic rivers, together with associated habitats such as ponds and lakes (in Brittany, in the valleys of mountainous areas and in the hills of the Central Massif);
- large Atlantic wetlands between the Loire and Gironde rivers;
- acidophilous lakes and ponds of the sandy zones of south-western France; neutrophilous and mesotrophic lakes (Grandlieu and Forêt d'Orient);
- steep-sided rivers of southern Central Massif;
- a few streams in the Alps;
- Atlantic coastline and islands (Brittany, Vendée, Charente-Maritime, Gironde, ...).

The study of the diet, carried out in three main regions, shows that the otter eats mainly fish but some other aquatic or semi-aquatic preys are of major dietary importance in oligotrophic habitats (LIBOIS, 1995). In the Marais Poitevin, the main species in the otters' diet are eels (*Anguilla anguilla*) and cyprinids, mainly tench (*Tinca tinca*), both in terms of frequency and biomass (LIBOIS & ROSOUX, 1989, 1991; ROSOUX, 1998a). In Brittany, salmonids are the most common prey on coastal streams while elsewhere bullheads (*Cottus gobio*) and minnows (*Phoxinus phoxinus*) are the most regular and the most abundant (LIBOIS et al., 1987). In the Massif Central, as far as the biomass is concerned, the role of the trout is essential; however, bullheads and gudgeons (*Gobio gobio*) also make up a large part of the diet in rivers, while in ponds these species are replaced by cyprinids (*Cyprinus carpio*, *Tinca tinca*, ...). In conclusion, the otter appears to be an opportunistic predator in aquatic environments, its diet varying greatly from one place to another. Small fish, small species and young individuals of larger species, are dominant in the diet.

Radio tracking of the otters in the Marais Poitevin showed that they are exclusively nocturnal and use a large home range. They also turned out to use a wide range of habitat for feeding and several resting places consisting of surface lairs and holts (ROSOUX, 1998a).

Mink

Regarding the Mink, the information published so far was scarce and not comprehensive. Although it was assumed to be strongly decreasing, its current distribution was very poorly known. From 1991, various studies and actions were undertaken:

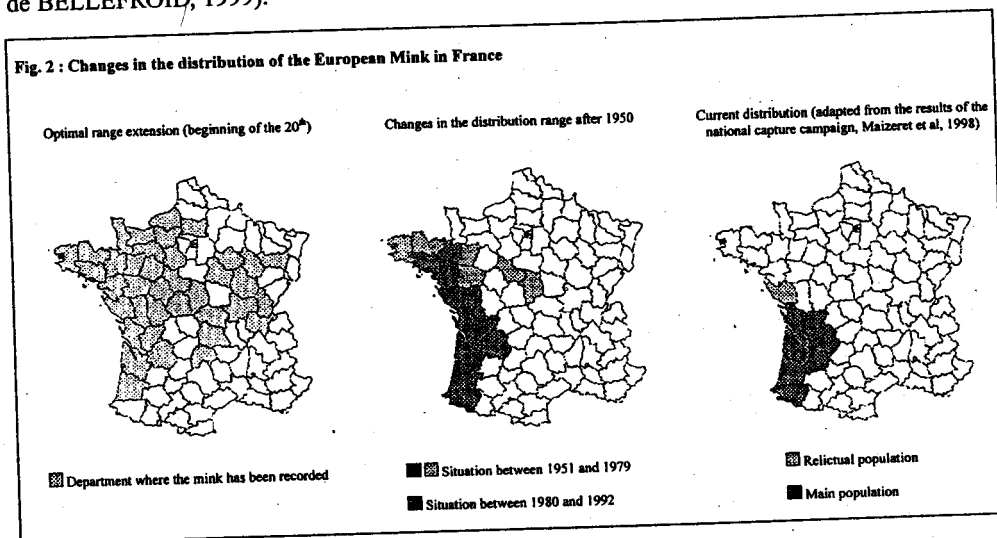
- Study on the current distribution of the species. The French Ministry of Environment initiated a capture campaign (1991-1997) in 17 departments along the Atlantic area (MAIZERET et al., 1995; MAIZERET et al., 1998).
- Biogeographical study of the species' diachronic distribution in France. As the reasons for its decline are still unknown and still have to be researched, a careful analysis of old literature data has been carried out as well as a review of museum specimens and of recent field observations and captures. Diachronic distribution maps have been established, since the first mention of the species in France in 1831 (de BELLEFROID & ROSOUX, 1998; de BELLEFROID, 1999).
- Study on the use of range and habitat by radiotracking. Several equipped individuals have been monitored in the Landes de Gascogne (south-western France) (GREGE, 1996 to 1999).
- Study of the diet of four equipped individuals (GREGE, 1997; LIBOIS et al., 1998).
- At the same time, a large public awareness and information campaign was launched amongst

trappers and wetland users in order to help identification and protection of the species. On site identification tools were developed.

Main results:

Nowadays, the mink is restricted to seven departments of south-western France and is very rare north of the river Charente (MAIZERET et al., 1998).

The diachronic distribution maps clearly show a spatiotemporal regression (see fig. 2). It appears that the general range of the European mink seems to have reached its maximal extension at the end of the 19th century – beginning of the 20th. At the time, the species was present in the wetlands and along the water courses of most of the lower regions, in particular in the central and western parts of the country. After 1930, the distribution range was progressively reduced and the species was only to be found in the departments along the Atlantic coast. The decline went on, from north to south. Its presence was reported in Brittany until 1986 (van BREE & SAINT GIRONS, 1966; de BELLEFROID, 1999).



Its presence on the northern Pyrenean slopes was first reported during the 1950s. It was discovered in northern Spain at the same time (RODRIGUEZ de ONDARRA, 1955). These facts suggest a slight southern expansion of its distribution range (PUENTE AMESTOY, 1956; RODRIGUEZ de ONDARRA, 1963; YOUNGMAN, 1982; PALAZON & RUIZ-OLMO, 1995, de BELLEFROID & ROSOUX, 1998; de BELLEFROID, 1999).

Different hypotheses have been explored to explain such a marked decrease, with no relictual population left behind the regression front. The species clearly started its decline before the use of remnant pesticides became widespread. Moreover, the first feral populations of American mink (*Mustela vison*) were reported long after the first signs of decline of the native species had appeared. Furthermore, Brittany is the only region where American mink forms feral populations important enough to constitute a threat to the European species. These feral populations only appeared in the 1960s (de BELLEFROID, 1999).

As far as habitat is concerned, the European mink seems to be found in any kind of wetlands (brooks, rivers, marshes, ponds, lakes, ...) with a preference for rivers, in particular for valleys liable

to flooding (GREGE, 1998; de BELLEFROID, 1999). Although the European mink appears to prefer a variety of natural habitats, it can also be found in damaged areas used for intensive farming and crossed by streams or rivers with poor water quality (de BELLEFROID, 1999).

We therefore think that not one factor alone amongst those usually incriminated can be responsible for the decrease. We are most probably facing a conjunction of factors or a succession of them in the time. The most probable cause of decline might be found in the field of ecotoxicology or parasitology (de BELLEFROID & ROSOUX, 1998; ANON., 1999).

Collecting scats in the field, for the study of the diet, is almost impossible since European mink's scats are identical to American mink's or polecat's ones (CAMBY, 1990). The diet of the first individuals radiotracked shows the mink is an opportunistic predator, eating almost every available aquatic or semi-aquatic prey: from fish to medium-sized mammals and from frogs to wildfowl, including eggs. The first four individuals studied in south-western France showed a clear preference for terrestrials and semi-aquatic vertebrates, in particular *Rattus* (28 %), *Arvicola*, *Ondatra*, ducks (24 %) and amphibians (18 %), principally of the genus *Rana* (n = 204; ind. = 4) (LIBOIS et al., 1998). However, the studies currently under way on other individuals show a more important consumption of fish.

Conservation Societies for wild fauna and institutions interested in mammal protection together with the Governmental institutions concerned, have set up national restoration programmes for these two semi-aquatic species throughout their French range (ANON., 1998 and 1999). Additional research programmes have been drafted and protection actions are ready to be implemented. These restoration plans will be regularly evaluated and controlled by an international steering committee.

Zusammenfassung

Sowohl Otter als auch Europäischer Nerz sind in Frankreich bedroht. Insbesondere der Nerz befindet sich am Rande zur Ausrottung. Die Studien wurden über mehr als 10 Jahre durchgeführt, um die Verbreitung und ökologischen Bedürfnisse dieser beiden semiaquatischen Mustelide zu verstehen. Die Ergebnisse der bereits abgeschlossenen bzw. laufenden Forschungsprogramme werden hier vorgestellt. Das französische Umweltministerium erstellte in Zusammenarbeit mit Artenschutzorganisationen und wissenschaftlichen Instituten zwei spezielle Wiederansiedlungspläne.

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