

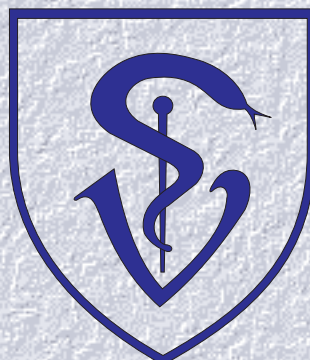


# **State Veterinary Administration of the Czech Republic**

**National Reference Laboratory for Rabies  
State Veterinary Institute - Liberec**

**Information Bulletin No. 8a/99**

**Rabies - Epizootiological Situation  
and Control in the Czech Republic  
up to 1998**



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State Veterinary Institute - Liberec

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# Rabies - Epizootiological Situation and Control in the Czech Republic up to 1998

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Prepared on the basis of data coming from the information system SVA CR

February 1999

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## 1. Introduction

Rabies is one of the terrific zoonoses that can fatally endanger lives of people. This disease has occurred in Europe since ancient times and mainly in some areas it has preserved in endemic form up to now. The highest incidence in Europe was noticed in 1989 - 24 377 cases. At present, the sylvatic form of this infection prevails with a red fox being the main vector and reservoir.

## 2. History of rabies on the territory of Bohemia, Moravia and Slovakia

### 2.1. Domestic animals

It was already in 1890 when rabies cases in dogs, cats and other animals were registered in Bohemia and Moravia in 68 districts out of 128. Each year hundreds of cases were noticed mainly in dogs which created 90 percent of the overall findings.

The majority of cases in domestic carnivores and farm animals occurred in villages and small towns in the heart of the country. Outbreaks of rabies in border areas in former Austro-Hungarian empire were rather sporadic but they show that rabies was then present not only in Bohemia and Moravia but also on the territory of present Poland and Hungary. Unfortunately data concerning Slovakia from that time are not available but we can suppose that the epidemiological situation was not too different.

More precise documentation of rabies in former Czechoslovakia comes from 1906 - 1910 and later from 1919 - 1939. No records are available from the years 1911 - 1919.

Table	Rabies incidence in Czechoslovakia up to 1939	<a href="#">V8HISTOR.XLS;</a> <a href="#">tab 01+graf 01</a>
Graph	Rabies cases in Czechoslovakia 1924 - 1939	

Nevertheless the available data show that rabies had been widespread in our country already before the First World War. After the war the occurrence of rabies cases increased and got into new areas.

Although the data about rabies in individual animal species are very often incomplete, they prove convincingly the highest incidence in dogs. The disease had a typical urban character at the time and a domestic dog was considered to be the main rabies vector on the whole territory. A rabid dog transmitted the disease by attacking other domestic animals, dogs and men, not only on the territory of its origin but also in the distance of several kilometres.

The then veterinary measures were focused mainly on the liquidation of suspected and stray dogs or cats.

According to old data, wildlife rabies was then no problem and no diagnostic attention was devoted to this matter. Rabies diagnosis was originally made on the basis of clinical symptoms which were sometimes supported by autopsy of the carcasses.

Laboratory examination of rabies was established in 1920 in the only State Diagnostic and Serotherapeutic Veterinary Institute in Ivanovice. Capacity of this laboratory was sufficient only for examination of domestic animals and men.

In the period of 1919 - 1937 132 inhabitants of Czechoslovakia died of rabies and nearly 25 000 people were vaccinated in a postexposure way in Pasteur Institute in Prague. Another hundreds of people living in eastern Slovakia were treated in Pasteur Institute in Košice.

In the 1920s 400 - 600 cases of rabies were laboratory proved. 86 % of them were dogs.

From 1929 the number of positive rabies cases in domestic animals was gradually decreasing. While in 1928 608 positive cases were proved (519 dogs, 47 cats, 32 heads of cattle, 2 goats), in 1929 455 cases were diagnosed (401 dogs, 24 cats and 30 other domestic animals). The number of rabies in domestic animals was gradually falling down until 1939 when only 33 cases were diagnosed. Huge vaccine campaigns of dogs carried out in some parts of Slovakia and Bohemia in 1929- 1931 improved the rabies situation.

In spite of the fact that in 1937 and 1938 slight increase of rabies was registered, 35 or rather 32 cases, the overall situation was stabilized.

Starting from 1940 till 1947 the occurrence of rabies can not be traced because laboratory reports from that period were destroyed. The institute that was carrying out diagnosing of lyssa was severely damaged during the war and the diagnosing could be reintroduced in the original extent as late as in 1947.

The incidence of rabies in domestic animals showed its typical dynamism. Most cases were diagnosed in winter, from January till April. The smallest incidence started on the contrary in July and finished in September. Geographical occurrence of rabies in dogs was bound more to border areas of Bohemia and Moravia reaching about 700m above sea level and mountainous parts of Slovakia. Stray rabid dogs from hilly endemic areas transmitted the disease into the lowlands.

## 2.2. Rabies in wildlife

Wild living animals were for many years out of interest of both the veterinary and public health services and were not laboratorily investigated. From time to time mass mortality of foxes was noticed, as for example in 1919 - 1920 but the etiology remains unexplained.

No information about rabies in wild living animals can be found in the historical records from the period of 1919 - 1939. Ursiny (1970) claims that rabies in foxes and wolves was sporadically registered in the eastern parts of Slovakia and western Ukraine. In 1929 a rabied wolf was killed in Povážská Bystrica district (Slovakia).

## 3. The situation after the Second World War

### 3.1. Sylvatic rabies in Europe

The beginning of European epizootic of fox rabies is usually localised in the focus south of Kaliningrad on the Polish-Russian border. The infection was supposed to spread from this area southwards and westwards and in 1950s have wide-spread in Czech and Slovak Republic. The disease reached the Elbe in 1950 and the Rhine in 1960 and entered France in 1968.

#### 3.1.1. Development of the rabies situation in Poland

All sum up data from neighbouring Poland and their detailed analyses show that the front line of the infection wave did not move regularly or continuously. New foci on the Polish territory had showed neither temporal nor spacial continuity.

Before the Second World War rabies in wildliving animals in Poland was never registered. Although the literary data say that there were a few cases of rabies in foxes and wolves but these cases were not laboratory confirmed.

The first laboratory confirmed data of 163 rabid foxes and six badgers were published during the years 1941 - 1943 and these related to the northwestern areas of the country .

After the Second World War laboratory diagnosed cases of rabid foxes and badgers were again reported in the north of Poland in Bydgoszcz, Gdansk and Olsztyn .

Seroka says that there were no cases of wildlife rabies in the neighbouring eastern provinces. On the other hand in the years 1947 - 1948 epizootic of rabies in foxes was registered in the south of Poland. In the following years no waves of rabies were noticed and new outbreaks appeared separately.

Observation and registration of fox rabies in Poland over the twenty years suggest that the disease spread from the northwest and from the south towards the central and eastern parts of the country. This movement was rather slow and in some areas of the central regions such as Lodz wildlife rabies was not observed until October 1978.

It is also Mol (1971) who presented sporadic cases in wildlife reaching about 1 - 7 cases per year in the period of 1948 - 1955. Rabies in wildlife increased significantly since 1957 and rabies in foxes, badgers and racoon dogs became a serious problem.

Since the beginning of 1962 control measures were put into operation with the help of foresters and hunters. In case of rabies outbreak in wildliving animals, infected and suspected zones were defined. In such areas no hunting, shooting and trapping was permitted. This measure was carried out from the presupposition that any interventions would increase migration and spreading of the disease. On the contrary hunting in the surrounding areas was supported . But none of these measures brought effect and the number of positive cases in wild animals has increased.

In 1961 45 rabies cases were registered, in 1962 59, in 1963 52, 1964 144 cases. The majority of them accounted for foxes but 18 badgers, 11 roedeers, 2 racoon dogs and 1 wolf were among them.

A significant increase of rabies was noticed mainly in the 70 s when the overall incidence reached 1200 - 1500 cases per year.

Seroka (1968) turned attention to the fact that the number of rabies outbreakes in wildlife has been growing and that rabies in some places appears stationary. The sylvatic foci are the sources of infection for the domestic animals. Prophylactic vaccination of dogs and occasionally cats as well as the elimination of stray carnivores remained the basic measures that prevented transmission of the disease from the wild nature. Control of rabies by mass gasing of fox dens was not approved by responsible authorities.

The highest incidence of rabies was registered in the first half of the 1990 s. During 1989 - 1994 11278 cases were registered in Poland, 81.9% occurred in wild animals. Of all affected wild animals 82.7% were foxes, followed by the racoon dog with 8.7%. The peak of rabies case in wildlife was experinced in 1992 with 2 547 cases reported.

Table	Cases of rabies in Poland 1946 - 1997	<a href="#">V8POLSKO.XLS; tab 01</a>
Graphs	The annual incidence of rabies in Poland 1946-1997 - Wild animals - Domestic animals	<a href="#">V8POLSKO.XLS; graf 01-02</a>
Maps	Distribution of rabies case in Poland - 1941 - 1943 - foxes and badgers - 1946 - 1955 - foxes and badgers - 1957 - 1959 - foxes - 1957 - 1967 - foxes	<a href="#">V8POLD.CDR</a>
Maps	Distribution of rabies cases in Poland - first quarter of 1993 - first quarter of 1998	<a href="#">V8PLSR.CDR</a>

### 3.1.2. Development of rabies situation in Slovakia

Spreading of wildlife rabies in Slovakia was not so intensive in comparison with the Czech Republic, as Ursiny declared (1962).

The first rabies case was registered in April 1947 in a former district called Sobrance. Another finding followed as late as in 1950 in the Prešov district. During the next twenty years rabies in foxes and other wild animals was registered only sporadically at a low level. Ursiny (1962) puts this situation down to veterinary effective measures, carried out in 1950 - 1955, that detained the wave of rabies in foxes and wolves which had spread from deep Carpathian forests. Besides of a compulsory vaccination of dogs, stray dogs were destroyed, individual and mass hunting of wild beasts of prey were organised. Only 5 fox rabies cases were registered in 1959. In the following years a considerable increase of wildlife rabies was noticed also in Slovakia. Sylvatic form has persisted there with fox being the principal vector upto now.

Wolves played a special role in rabies epidemiology. Rabies of wolves was found quite rarely but the epidemiological consequences were usually dramatic.

A first rabid wolf was noticed in east Slovakia (Stropkov) in 1951. Also in the following years wolves participated in spreading of rabies in Slovakia. Rabid wolves indicated a great number of domestic and farm animals in 1958, 1959 and 1960. For example a rabid wolf bit 51 heads of cattle, 3 hoarses, 2 goats and many dogs. The majority of them had to be put down but 14 heads of cattle and 1 goat became ill from rabies. The author remarked that one cow became ill after nine months of the incubation period. In 1961 another rabid wolf infected not only cattle but also a man who died of lyssa.

Growing importance of foxes in rabies epidemiology has been noticed in Slovakia since the beginning of the 1960 s (Ursiny 10). The role of foxes from the afterwar period upto now has been described and analysed by many a Czech and Slovak authors .

Their conclusions confirmed the dominant position of foxes in the spreading of the disease. Necessary reduction of disproportionately high numbers of foxes was often suggested.

To fill this purpose, gasing of fox dens was introduced in the time of cubs delivery . The first gasing campaign was carried out in spring 1971 in the most affected districts of central Slovakia. Further campaigns went on

during the following two years on the whole territory of Slovakia. This control method was then abandoned for not being ethical and effective.

Incidence of rabies in the following years varied but the increasing tendency was undisputable. Significant increase was noticed in the 90s. The highest figures of positive findings were recorded in 1993 (489 cases) and in 1994 (560). Foxes accounted for up to 80%. Domestic animals participated by 15 - 20%.

Slovakia has joined the European programme of oral vaccination in 1992 - 1993, where the first few districts were vaccinated. The year 1994 was the first year of a three-year plan (1994 - 1996), when an oral antirabies vaccination of freelifving foxes was carried out on the whole territory of Slovakia. In selected districts the oral vaccination has continued in the following years bringing positive results.

Rabies control of domestic animals is based on annual compulsory vaccination of dogs and voluntary vaccination of cats and farm animals. In 1998 414 cases of rabies were registered with the participation of domestic animals by 16% and wildliving animals by 84%.

From the geographical point of view rabies foci were scattered nearly over the whole country with highest concentration of rabies cases near the southwestern area bordering Austria and Hungary. The situation of the first quarter 1998 is shown on the map.

Table	Cases of rabies in Slovakia 1947 - 1998	<a href="#">V8SLOVEN.XLS; tab 01</a>
Graphs	The annual incidence of rabies in Slovakia 1947 – 1998 - Wild animals - Domestic animals	<a href="#">V8SLOVEN.XLS; graf 01-02</a>
Maps	Distribution of rabies cases in Slovakia - first quarter of 1993 - first quarter of 1998	<a href="#">V8PLSR.CDR</a>

### 3.2. Development of rabies situation in the Czech Republic

The rabies situation has significantly changed after the Second World War. Population of foxes dramatically increased mainly in border hilly and forested areas. Towards the end of 1946 and at the beginning of 1947 mass mortality of foxes suspected of rabies was noticed. Therefore laboratory examination was extended also to wild living animals. In 1947 two specialised diagnostical laboratories were established, the first one in Liberec-Vratislavice to cover Bohemia and the second one in Bratislava for Slovakia.

In Bohemia the first case of fox rabies was laboratory diagnosed in March 1947 in the Broumov district neighbouring the Czech - Polish borders. Further cases followed in the same year. One of them was found in the Jeseník district also near to the Polish border in the distance of fifty kilometres towards east from the first focus. Another case was registered in the south Bohemia in the Jindřichův Hradec district bordering Austria. Novický (1965) does not see any connection between both the outbreaks because their distance was more than 150 kilometres. Crossborder transmission was also unlikely because no rabies in Austria at that time was registered. The author comes to the conclusion that the rabies did not get into our country from abroad but it had already existed here without having been diagnosed.

In the following year in 1948 considerable increase of rabies incidence was registered. 146 cases were recorded, of which foxes participated by 106 cases (74%).

Rabies in foxes and other wild animals was verified in many border Czech and Moravian districts.

Even though rabies incidence in following years declined, wildlife rabies became endemic in our country. In the 1950s the importance of foxes in rabies epizootiology was increasing and red fox became the principal vector and reservoir of rabies in our country. In January 1953 compulsory and free of charge vaccination was ordered on the whole territory of the state. Rabies in domestic animals consequently fell down and sylvatic rabies gained a dominant position. The annual rabies occurrence in dogs varied in the period of 1954 - 1970 in the extent from 0 to 10 cases. On the other hand several hundreds of fox rabies were registered per year.

Retrospective epizootiological analyses and surveys of results carried out in different periods proved the dominant role of foxes and brought other important findings:

- ◆ Rabies in domestic animals was diagnosed only in districts where fox rabies had already been found before.

- ◆ Other wild animal species suffering from rabies (roe deers badgers, martens...) represent rather a victim than an active spreader of the disease.
- ◆ The development of rabies incidence of foxes in the course of years exhibited roughly four-year cycles.
- ◆ Season dynamism of rabies was characterised by the highest number of cases in March and April, depression in summer and mild peak in autumn.
- ◆ Since the 1950 s rabies in the Czech Republic has persisted in the typical sylvatic form with occasional transmission to domestic animals.
- ◆ No direct transmission of rabies among domestic animals has been registered.

During the period of 1969 - 1979 rabies strains with biological properties different from common street rabies virus have been isolated from small wild rodents . These "murine rabies" raised discussion about a possible role of rodents that could serve as a natural rabies reservoir . This assumption was not confirmed by further investigation.

Continual research carried out during 1960 - 1974 has proved that fox rabies has become endemic in the border areas of west and north Bohemia and north Moravia. This situation did not change until 1975. In 1976 rabies began to spread from the western borders towards the interior .

Table	Rabies cases in the Czech Republic 1947 - 1998	<a href="#">V8HISTOR.XLS; tab 02</a>
Graphs	Development of rabies in the Czech Republic 1947 - 1998 - Wild animals - Domestic animals	<a href="#">V8HISTOR.XLS; graf 02-03</a>
Map	Distribution of rabies cases in foxes 1947 -1948	<a href="#">V8N-OLD.CDR</a>
Map	Spread of sylvatic rabies in the Czech Republic	
Map	Rabies cases in 1982	<a href="#">V82-83N.CDR</a>
Map	Rabies cases in 1983	
Map	Rabies cases in 1984	<a href="#">V84-85N.CDR</a>
Map	Rabies cases in 1985	
Map	Rabies cases in 1986	<a href="#">V86-87N.CDR</a>
Map	Rabies cases in 1987	
Map	Rabies cases in 1988	<a href="#">V88-89N.CDR</a>
Map	Rabies cases in 1989	
Graphs	Rabies incidence in the Czech Republic in 1989-1998 - Wild animals - Domestic animals	<a href="#">V8HISTOR.XLS; graf 04-05</a>
Maps	Spread of rabies in North Bohemia 1995 - 1998 - January to June 1995 - March to August 1995 - May to October 1995 - July to December 1995 - September 1995 to February 1996 - November 1995 to April 1996	<a href="#">V8SNSC1.CDR</a>
Maps	Spread of rabies in North Bohemia 1995 - 1998 - January to June 1996 - March to August 1996 - May to October 1996 - July to December 1996 - September 1996 to February 1997 - November 1996 to April 1997	<a href="#">V8SNSC2.CDR</a>

Maps	Spread of rabies in North Bohemia 1995 - 1998 - January to June 1997 - March to August 1997 - May to October 1997 - July to December 1997 - September 1997 to February 1998 - November 1997 to April 1998	<a href="#">V8SNSC3.CDR</a>
Maps	Spread of rabies in North Bohemia 1995 - 1998 - January to June 1998 - March to August 1998 - May to October 1998 - July to December 1998	<a href="#">V8SNSC4.CDR</a>

During the year 1977 the situation constantly deteriorated and the mountain barrier in border areas of our country did not restrict the movement of foxes and the spread of rabies to new territories. Further spreading was slowed down but not stopped by the Vltava river. The first cases were found near bridges and places where the river gets frozen over in winter.

Neither paying a bounty for hunted foxes which was introduced in 1969 nor the gassing of fox dens carried out in 1979 - 1984 improved the situation permanently.

In the 80 s rabies reached the highest geographical extension. The whole territory of the Czech Republic was affected with the exception of several districts.

The maximum incidence of rabies was recorded in 1984, reaching 2232 cases of which 2052 were foxes. In spite of a slight decline of the occurrence the situation was not satisfactory.

### 3.3. Oral vaccination of foxes

It was the oral vaccination that was launched in 1989 in a few districts adjacent to German borders which brought on significant improvement. In the course of the following years the treated territory was extended reaching about 60% of the country in 1992. In 1993, the whole area of the country was vaccinated with the exception of the districts that already been freed from rabies. Over the next years the strategy of oral vaccination was based on the two basic principles :

- a) Profound treatment in the districts affected with rabies.
- b) Implementation of the oral immunization for at least two years after the last outbreak.

Maps	Oral vaccination of foxes against rabies - 1989 - spring 1990 and 1991 - autumn 1991 - spring 1992 - autumn 1992 and spring 1993 - autumn 1993 - spring and autumn 1994 - spring 1995	<a href="#">V89-95V.CDR</a>
Maps	Oral vaccination of foxes against rabies - autumn 1995 - spring 1996 - autumn 1996 - spring and autumn 1997 - spring and autumn 1998	<a href="#">V95-98V.CDR</a>

The original Tubingen type of vaccine prepared from an attenuated strain SAD B19 has been used up to the spring 1992. Also in 1992, a field trial was started in South Moravia with vaccine LYSVULPEN manufactured by BIOVETA Ivanovice taking use of the SAD Bern strain . Since that time only Czech made vaccine is used in the Czech Republic.



Campaigns of oral vaccination are performed twice a year in spring and autumn. Up to now, majority of vaccine baits has been layed out manually and limited part has been distributed by aircraft.

The continual decline of rabies cases was registered since the beginning of the oral vaccination reaching in 1998 94 % reduction in comparison with the initial year 1989. The number of cases was reduced from the original 1501 cases to 85 cases in 1998. The geographical distribution is pictured on the maps.

Map	Rabies cases in 1990	<a href="#">V90-91N.CDR</a>
Map	Rabies cases in 1991	
Map	Rabies cases in 1992	<a href="#">V92-93N.CDR</a>
Map	Rabies cases in 1993	
Map	Rabies cases in 1994	<a href="#">V94-95N.CDR</a>
Map	Rabies cases in 1995	
Map	Rabies cases in 1996	<a href="#">V96-97N.CDR</a>
Map	Rabies cases in 1997	
Map	Rabies cases in 1998	<a href="#">V98N.CDR</a>

### 3.4. Diagnostics

#### 3.4.1. Diagnostic laboratories

The rabies laboratory examination was performed in three specialized laboratories in the Czech Republic territory :

- ◆ The National Reference Laboratory for Rabies, State Veterinary Institute, Liberec
- ◆ State Veterinary Institute, Olomouc
- ◆ State Veterinary Institute, Praha

A direct fluorescent antibody test complemented by the mouse inoculation test in indicated cases were the basic diagnostic methods. Participation of responsible state laboratories on the total number of samples is demonstrated in graphs.

Graphs	Participation of particular labs in the total examination number	<a href="#">V8SVU.XLS; graf 01-04</a>
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#### 3.4.2. Animals tested

The examined animals originated from all districts of the Czech Republic. The whole territory of the state is monitored in this way.

Map	Geografical distribution of samples examined for rabies in 1997	<a href="#">V97-98L.CDR</a>
Map	Geografical distribution of samples examined for rabies in 1998	

The wild animals contributed to the total examination volume by about 80 %. The most frequent were foxes. Of the domestic animals the dogs and cats were the most examined animals. The numbers of monthly examined animals in 1996 - 98 is demonstrated in graph. Review of rabies laboratory examination in 1998 is showed in table.

Table	Review of rabies laboratory examination in the CR in 1998	<a href="#">V8ZVIRE; tab 01</a>
Table	Rabies cases in the Czech republic per month - 1998	<a href="#">V8MESICE.XLS; tab 01+graf 01-02</a>
Graph	Samples examined for rabies in 1996 - 1998 per month	
Graph	Rabies positive findings per month - 1996 to 1998	

### 3.4.3. Rabies incidence in animals in CR 1989 - 98

Satisfactory development of rabies incidence was registered during last decade. The number of rabies cases has been significantly decreased.

Table	Review of rabies laboratory examination in the CR in 1998	<a href="#">V8ZVIRE; tab 01</a>
Table	Rabies cases in the Czech republic per month - 1998	<a href="#">V8MESICE.XLS;</a> <a href="#">tab 01+graf 01-02</a>
Graph	Samples examined for rabies in 1996 - 1998 per month	
Graph	Rabies positive findings per month - 1996 to 1998	

Foxes keep their dominant position in the epizootiology of rabies and remain principal reservoir and vector of the disease. Rabies in other wild animals occurs sporadically. Low number of rabies cases is registered regularly in roe-deers and martens. Rabies in both animal categories is associated with fox rabies areas.

Map	Distribution of rabies cases in roe-deers in 1984 -1988	<a href="#">V8SRNCI.CDR</a>
Map	Distribution of rabies cases in roe-deers in 1994 -1998	
Map	Distribution of rabies cases in martens in 1984 -1988	<a href="#">V8KUNY.CDR</a>
Map	Distribution of rabies cases in martens in 1994 - 1998	

In the period 1985 - 1989, season dynamism of rabies was characterised by the highest number of cases in March and April, depression in summer and mild peak in autumn.

The positive findings per month were more balanced throughout the years 1994 - 1998 and the curve of incidence lost their typical course.

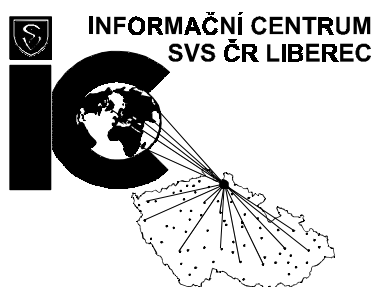
Graphs	Participation of animal species on rabies examination - 1995 to 1998	<a href="#">V8ZVIRE.XLS;</a> <a href="#">graf 01-05</a>
Graph	The average number of cases per month	

### 3.4.4. Geographical distribution of rabies in 1998

From geographical point of view total improvement has been recorded but there are some areas with residual foci.

Rabies was recorded in 11 districts and on the territory of Prague. Concentration of rabies cases was noticed in North Bohemia mainly in the districts Ústí nad Labem (17) and Litoměřice (14). Higher number of cases was also registered in district Jihlava (11) and Pelhřimov (7).

Tables	Nález Rabies cases in the districts of the Czech Republic in 1998	<a href="#">V8OKRESY.XLS;</a> <a href="#">tab 01-07</a>
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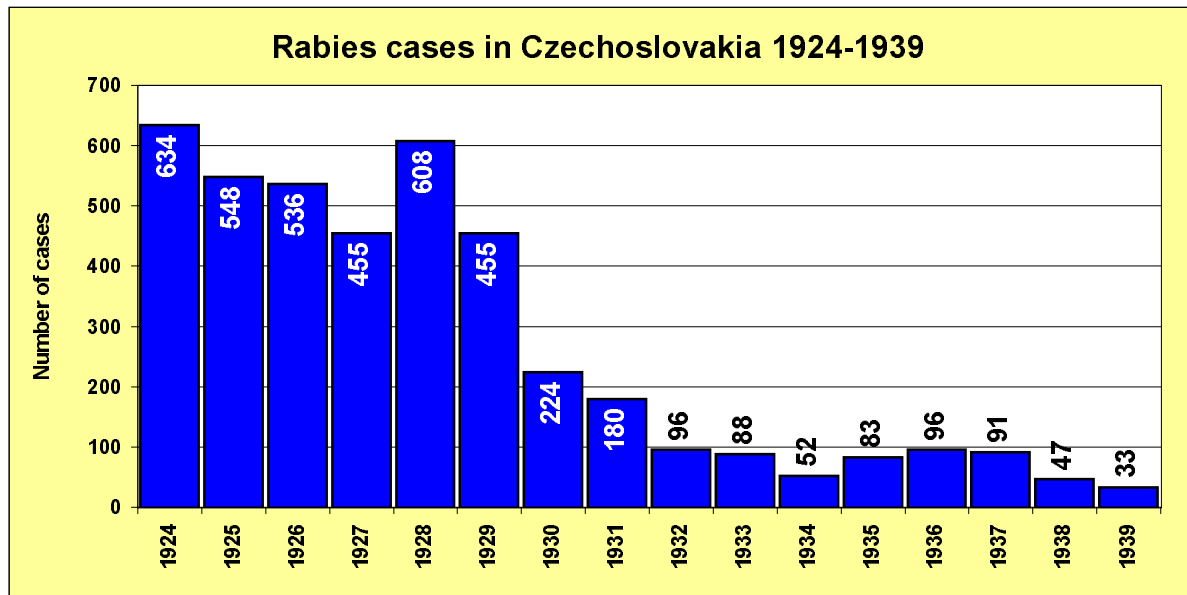
e-mail: [icsvscr@icsvscr.cz](mailto:icsvscr@icsvscr.cz)

## Rabies cases in Czechoslovakia 1906-1939

Year	Dog	Cat	Other domestic animals	Total
1906	387			387
1907	337	7	2	346
1908	887			887
1909	519	5	26	550
1910	568		6	574
no data				
1919	333	26	6	365
1920 *	151	9	2	162
no data				
1924	533	52	49	634
1925	483	36	29	548
1926	472	37	27	536
1927	382	26	47	455

Year	Dog	Cat	Other domestic animals	Total
1928	519	47	42	608
1929	401	24	30	455
1930	203	10	11	224
1931	162	9	9	180
1932	95	1		96
1933	76	7	5	88
1934	47	2	3	52
1935	76	2	5	83
1936	89	3	4	96
1937	78	2	11	91
1938	41	4	2	47
1939	32		1	33

\* 1920 data only half year

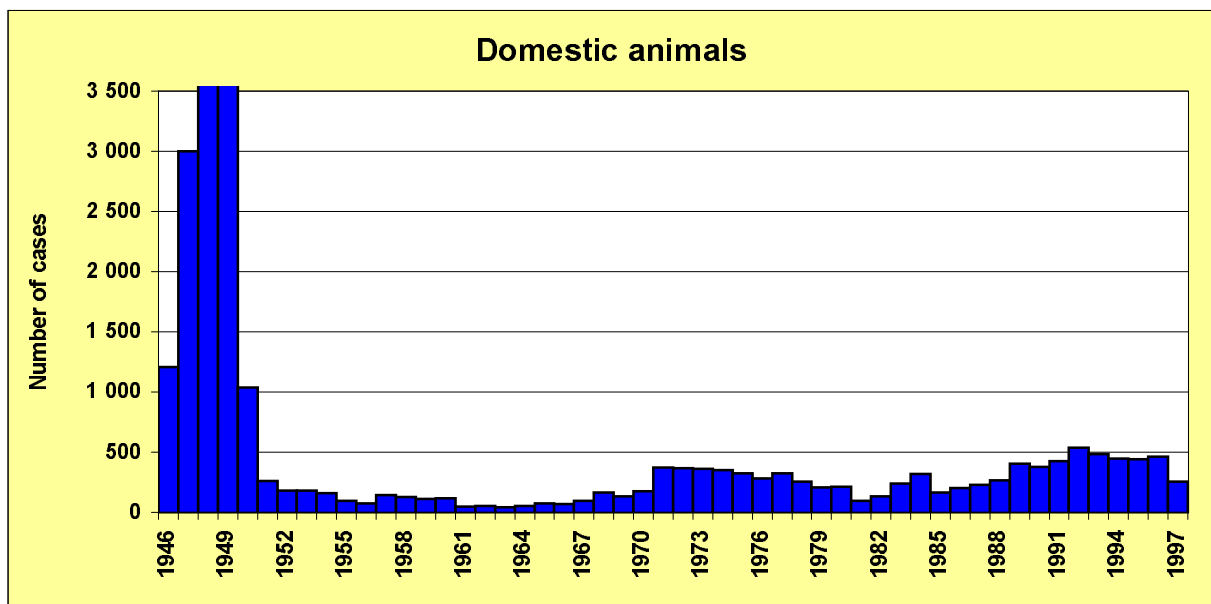
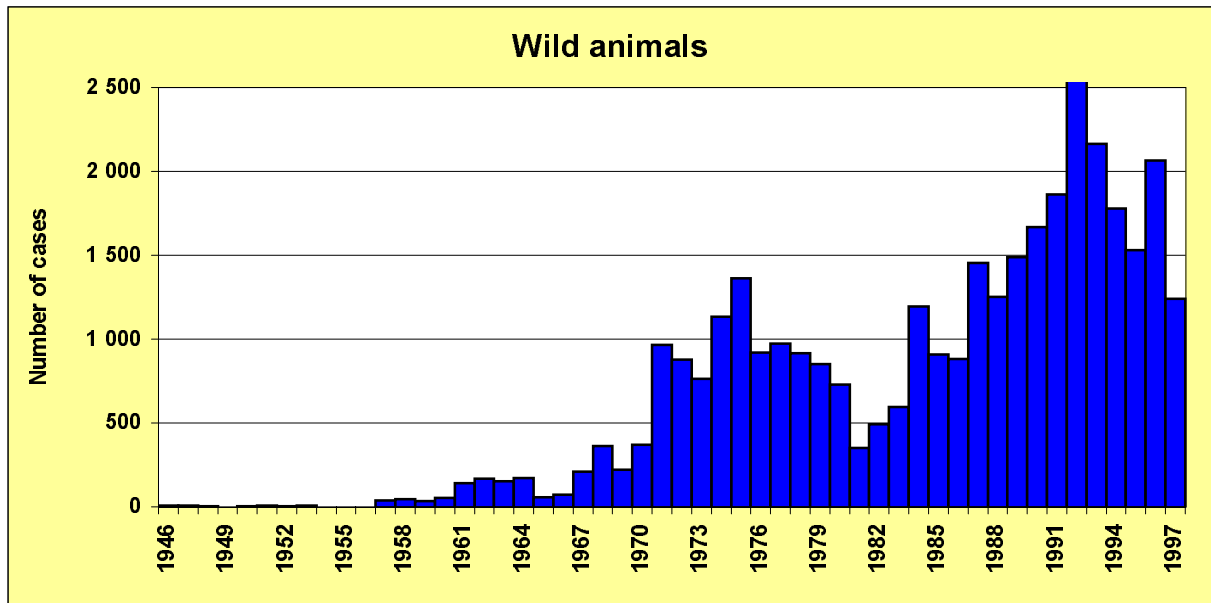


## Cases of rabies in Poland 1946-1997

Year	Domestic animals	Wild animals	TOTAL
1946	1 209	9	1 218
1947	2 999	8	3 007
1948	3 670	5	3 675
1949	3 623	1	3 624
1950	1 035	5	1 040
1951	259	7	266
1952	182	5	187
1953	183	7	190
1954	159	1	160
1955	98	1	99
1956	72		72
1957	145	39	184
1958	128	47	175
1959	112	35	147
1960	115	54	169
1961	50	142	192
1962	51	168	219
1963	44	154	198
1964	55	173	228
1965	75	57	132
1966	70	73	143
1967	98	210	308
1968	166	363	529
1969	133	221	354
1970	176	372	548
1971	370	966	1 336

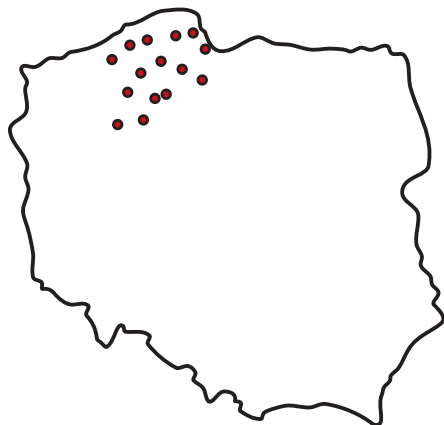
Year	Domestic animals	Wild animals	TOTAL
1972	367	879	1 246
1973	361	762	1 123
1974	351	1 134	1 485
1975	324	1 363	1 687
1976	282	918	1 200
1977	322	973	1 295
1978	253	915	1 168
1979	210	853	1 063
1980	215	729	944
1981	95	353	448
1982	134	493	627
1983	241	594	835
1984	321	1 194	1 515
1985	166	907	1 073
1986	204	883	1 087
1987	230	1 456	1 686
1988	266	1 252	1 518
1989	404	1 487	1 891
1990	376	1 669	2 045
1991	423	1 864	2 287
1992	537	2 547	3 084
1993	482	2 163	2 645
1994	449	1 778	2 227
1995	442	1 531	1 973
1996	461	2 065	2 526
1997	255	1 240	1 495

## The annual incidence of rabies in Poland 1946-1997

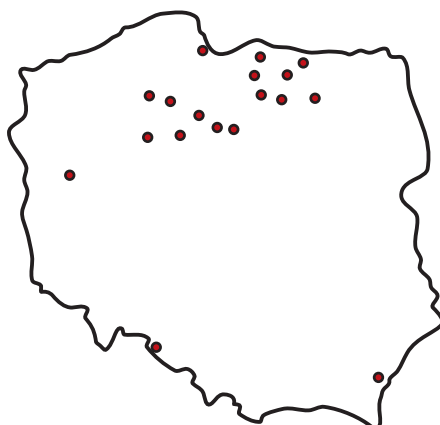


# Distribution of rabies cases in Poland

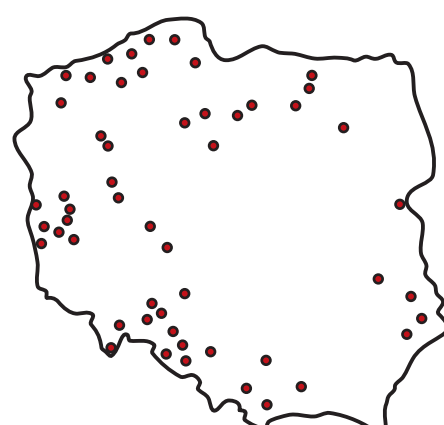
1941-1943  
foxes and badgers



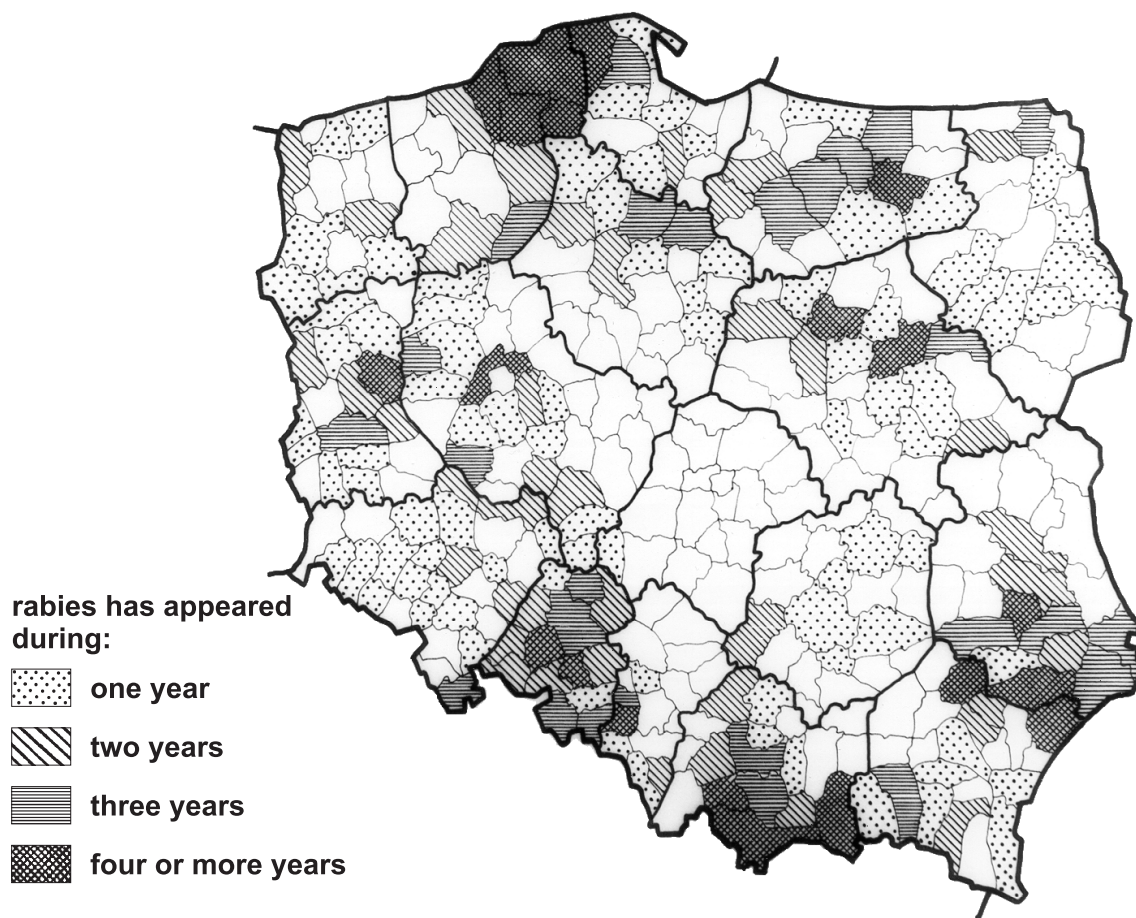
1946-1955  
foxes and badgers



1957-1959  
foxes



1957-1967  
foxes



## Distribution of rabies cases in Poland

first quarter of 1993

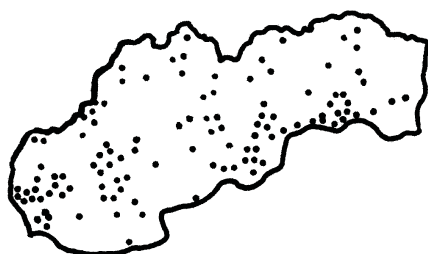


first quarter of 1998

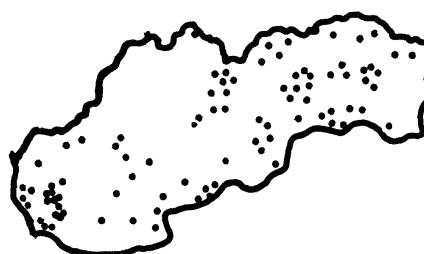


## Distribution of rabies cases in Slovakia

first quarter of 1993



first quarter of 1998

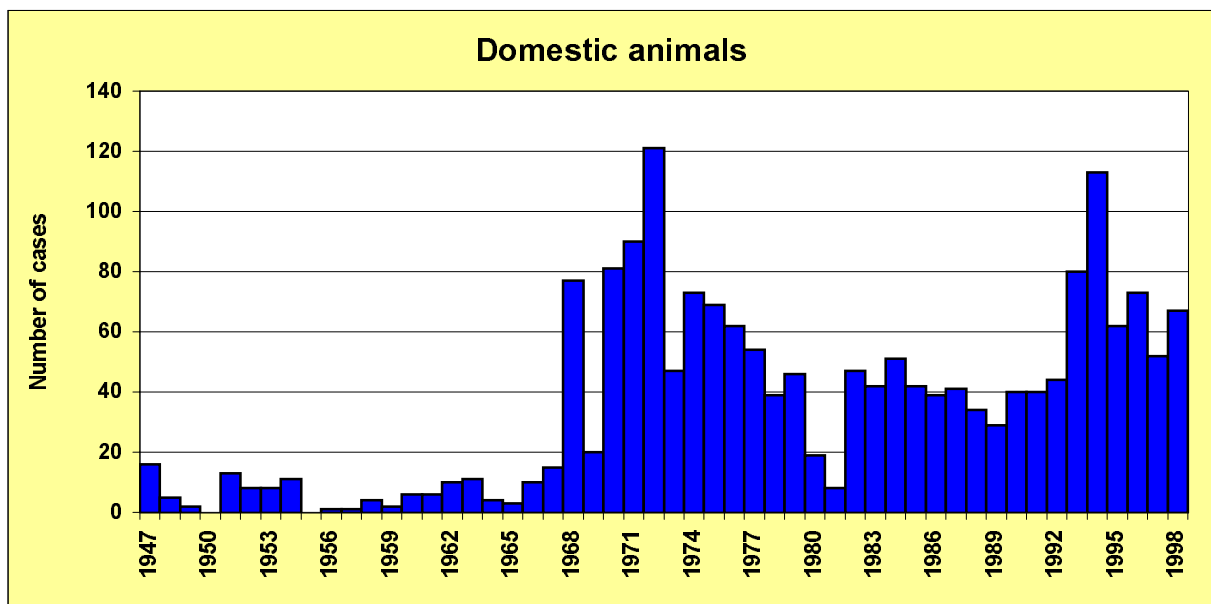
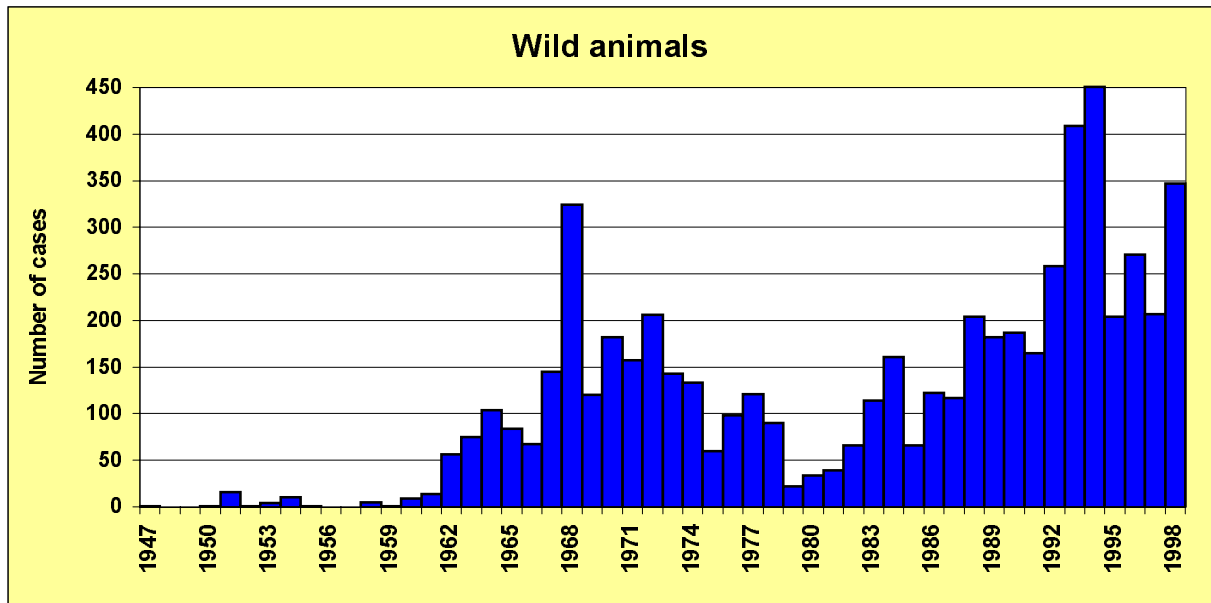


## Cases of rabies in Slovakia 1947-1998

Year	Dog	Cat	Other domestic animals	Total domestic animals	Fox	Other wild animals	Total wild animals	TOTAL
1947	13		3	16	1		1	17
1948	4	1		5			0	5
1949	1	1		2			0	2
1950				0	1		1	1
1951	9	3	1	13	14	2	16	29
1952	4	4		8		1	1	9
1953	7	1		8	3	1	4	12
1954	8	3		11	8	2	10	21
1955				0	1		1	1
1956			1	1			0	1
1957	1			1			0	1
1958			4	4	4	1	5	9
1959		1	1	2		1	1	3
1960	2	1	3	6	5	4	9	15
1961	2	2	2	6	12	2	14	20
1962	1	2	7	10	53	3	56	66
1963	3	5	3	11	66	9	75	86
1964	2	2		4	98	6	104	108
1965	1	2		3	77	7	84	87
1966	6	2	2	10	67		67	77
1967	7	5	3	15	138	7	145	160
1968	28	26	23	77	287	37	324	401
1969	9	8	3	20	112	8	120	140
1970	32	22	27	81	166	16	182	263
1971	35	46	9	90	146	11	157	247
1972	38	45	38	121	148	58	206	327
1973	32	15		47	120	23	143	190
1974	34	19	20	73	110	23	133	206
1975	34	30	5	69	54	6	60	129
1976	27	23	12	62	89	9	98	160
1977	25	27	2	54	111	10	121	175
1978	17	20	2	39	81	9	90	129
1979	24	22		46	14	8	22	68
1980	11	8		19	29	5	34	53
1981	6	2		8	35	4	39	47
1982	17	28	2	47	66		66	113
1983	13	24	5	42	112	2	114	156
1984	15	33	3	51	158	3	161	212
1985	17	22	3	42	61	5	66	108
1986	20	18	1	39	114	8	122	161
1987	14	17	10	41	114	3	117	158
1988	13	19	2	34	197	7	204	238
1989	10	16	3	29	173	9	182	211
1990	22	17	1	40	185	2	187	227
1991	15	18	7	40	163	2	165	205
1992	11	32	1	44	249	9	258	302
1993	25	48	7	80	393	16	409	489
1994	64	43	6	113	427	24	451	564
1995	32	24	6	62	197	7	204	266
1996	24	43	6	73	256	15	271	344
1997	19	30	3	52	198	9	207	259
1998	28	34	5	67	336	11	347	414



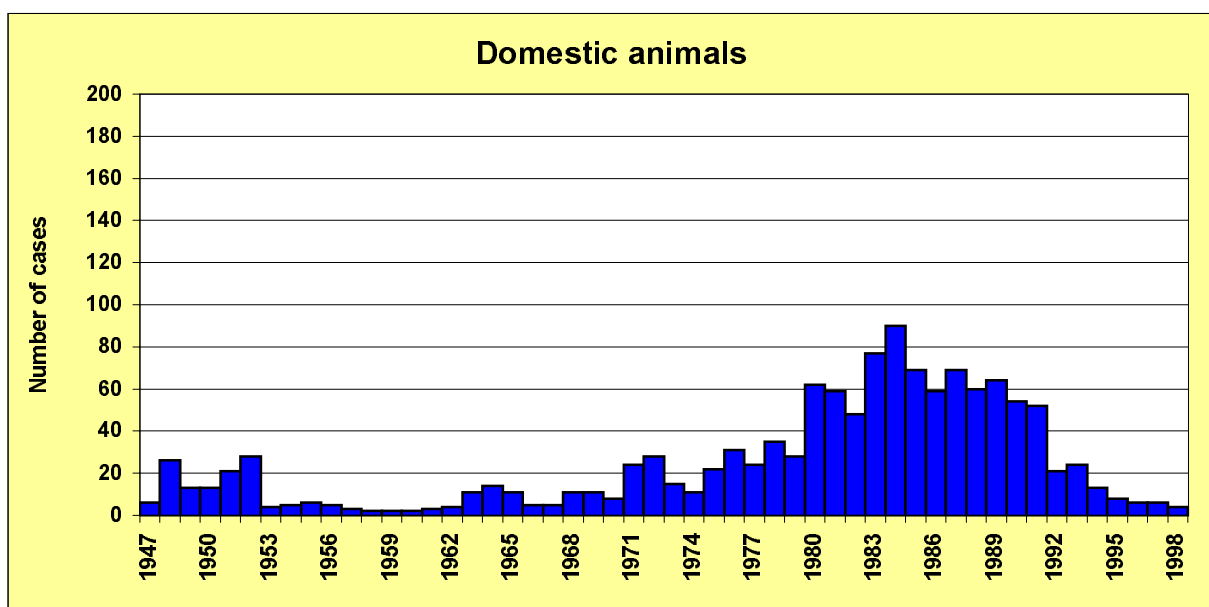
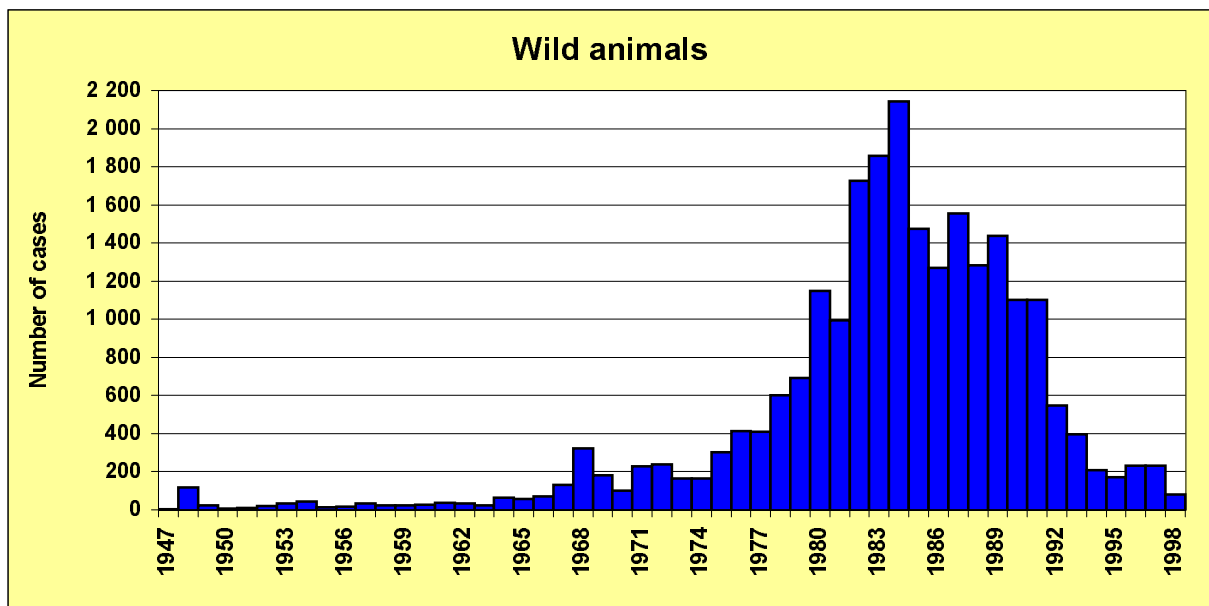
## The annual incidence of rabies in Slovakia 1947-1998



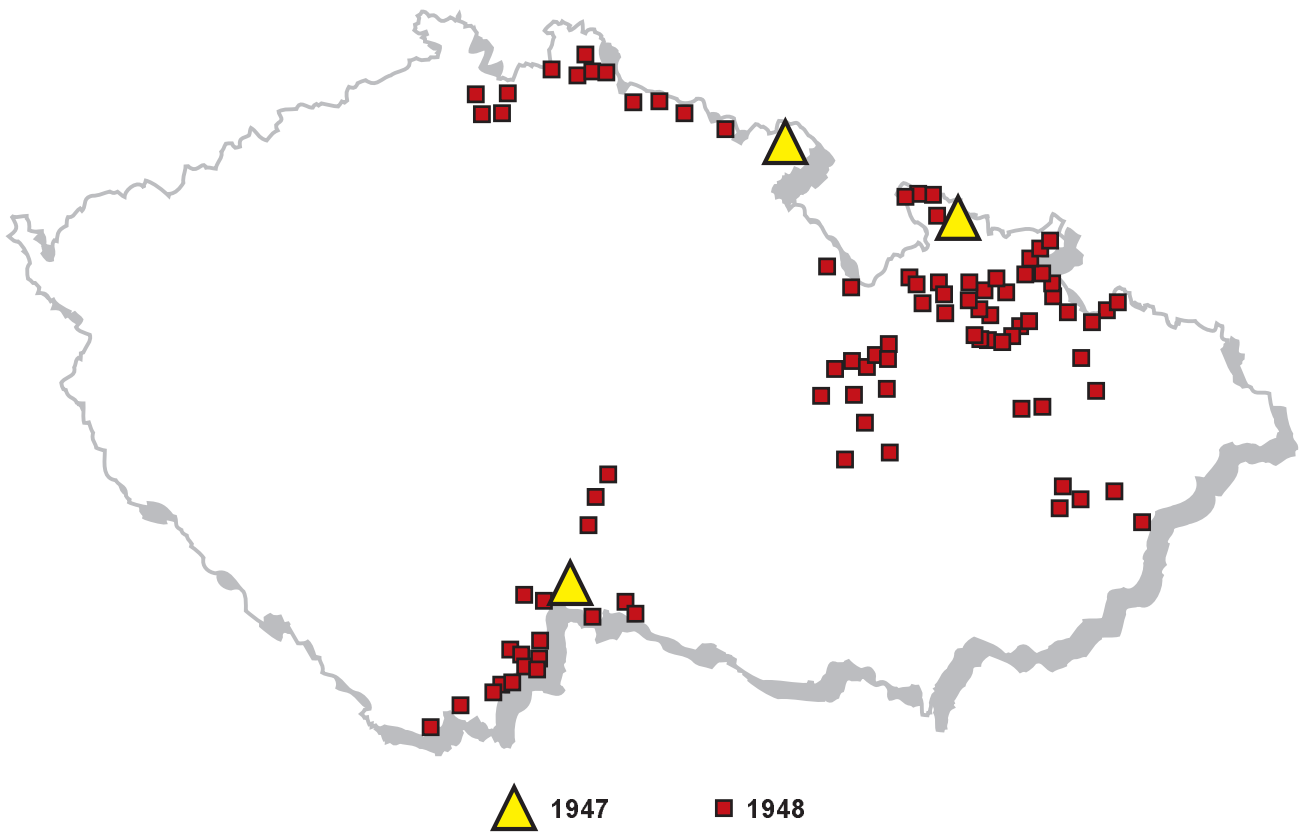
## Rabies cases in the Czech Republic 1947-1998

Year	Dog	Cat	Other domestic animals	Total domestic animals	Fox	Other wild animals	Total wild animals	TOTAL
1947	3	3		6	3		3	9
1948	24	1	1	26	106	11	117	143
1949	12	1		13	22	3	25	38
1950	9	3	1	13	7		7	20
1951	16	2	3	21	9		9	30
1952	21	5	2	28	19		19	47
1953	3	1		4	34		34	38
1954	4	1		5	44		44	49
1955	3	3		6	12		12	18
1956	2	3		5	16		16	21
1957	1	2		3	33		33	36
1958		2		2	25		25	27
1959	1	1		2	23		23	25
1960		1	1	2	26		26	28
1961		3		3	36		36	39
1962	1	3		4	32		32	36
1963	8	2	1	11	25		25	36
1964	8	6		14	60	4	64	78
1965	4	5	2	11	57	1	58	69
1966	1	2	2	5	70	1	71	76
1967	1	4		5	124	6	130	135
1968	9	2		11	312	11	323	334
1969	6	5		11	177	5	182	193
1970	5	3		8	100	2	102	110
1971	16	7	1	24	223	5	228	252
1972	20	8		28	231	8	239	267
1973	3	12		15	158	7	165	180
1974	3	7	1	11	160	5	165	176
1975	4	11	7	22	297	6	303	325
1976	18	7	6	31	390	23	413	444
1977	9	15		24	387	22	409	433
1978	11	19	5	35	571	30	601	636
1979	8	15	5	28	657	34	691	719
1980	16	37	9	62	1 093	55	1 148	1 210
1981	19	30	10	59	952	42	994	1 053
1982	20	23	5	48	1 645	83	1 728	1 776
1983	20	47	10	77	1 768	89	1 857	1 934
1984	24	62	4	90	2 052	90	2 142	2 232
1985	26	39	4	69	1 421	52	1 473	1 542
1986	16	37	6	59	1 207	63	1 270	1 329
1987	13	46	10	69	1 491	65	1 556	1 625
1988	15	38	7	60	1 220	62	1 282	1 342
1989	10	45	9	64	1 369	68	1 437	1 501
1990	9	34	11	54	1 046	57	1 103	1 157
1991	8	30	14	52	1 044	58	1 102	1 154
1992	7	14		21	526	23	549	570
1993	2	19	3	24	359	39	398	422
1994	6	5	2	13	191	17	208	221
1995	2	5	1	8	157	13	170	178
1996		3	3	6	223	8	231	237
1997		6		6	224	8	232	238
1998	1	3		4	77	4	81	85

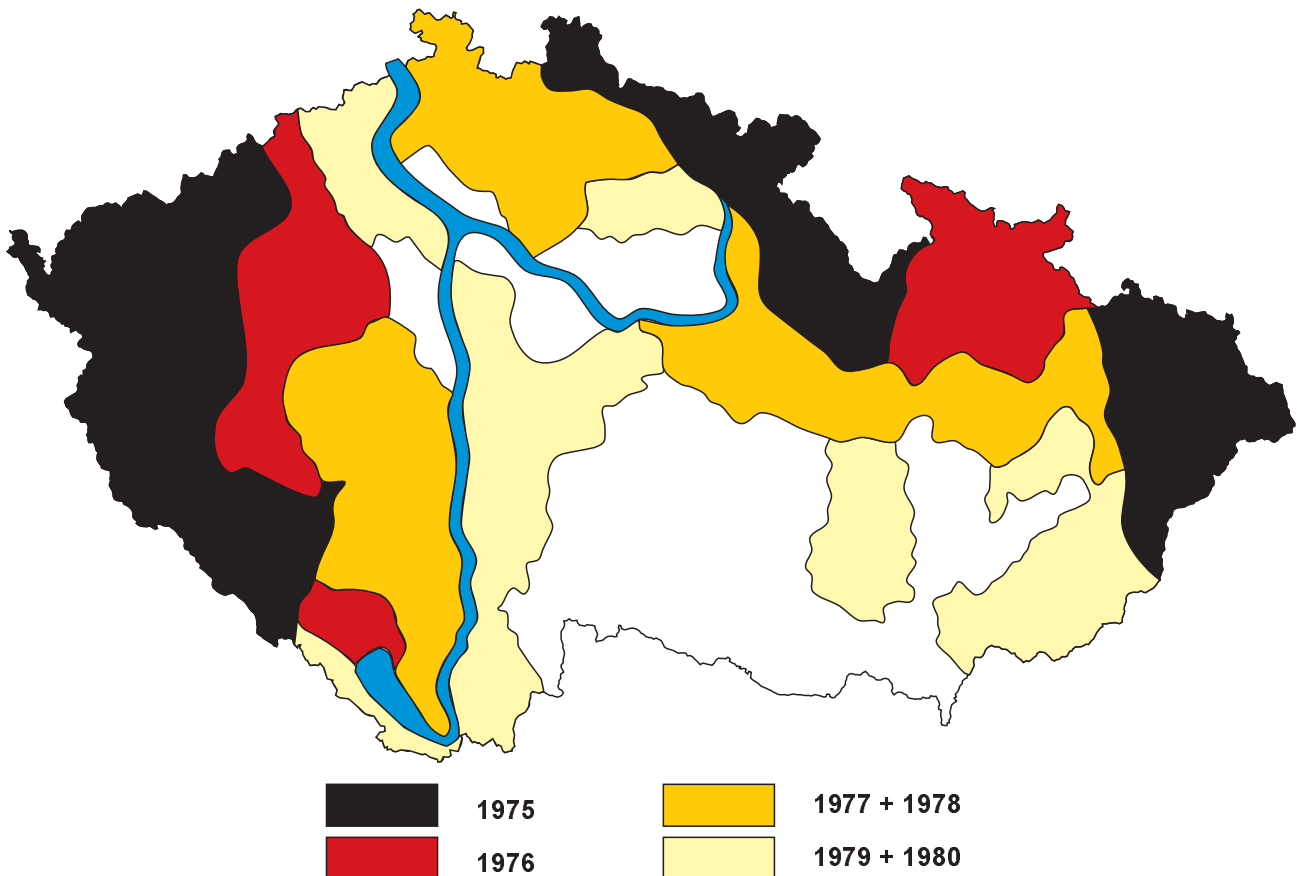
## Development of rabies in the Czech Republic 1947-1998



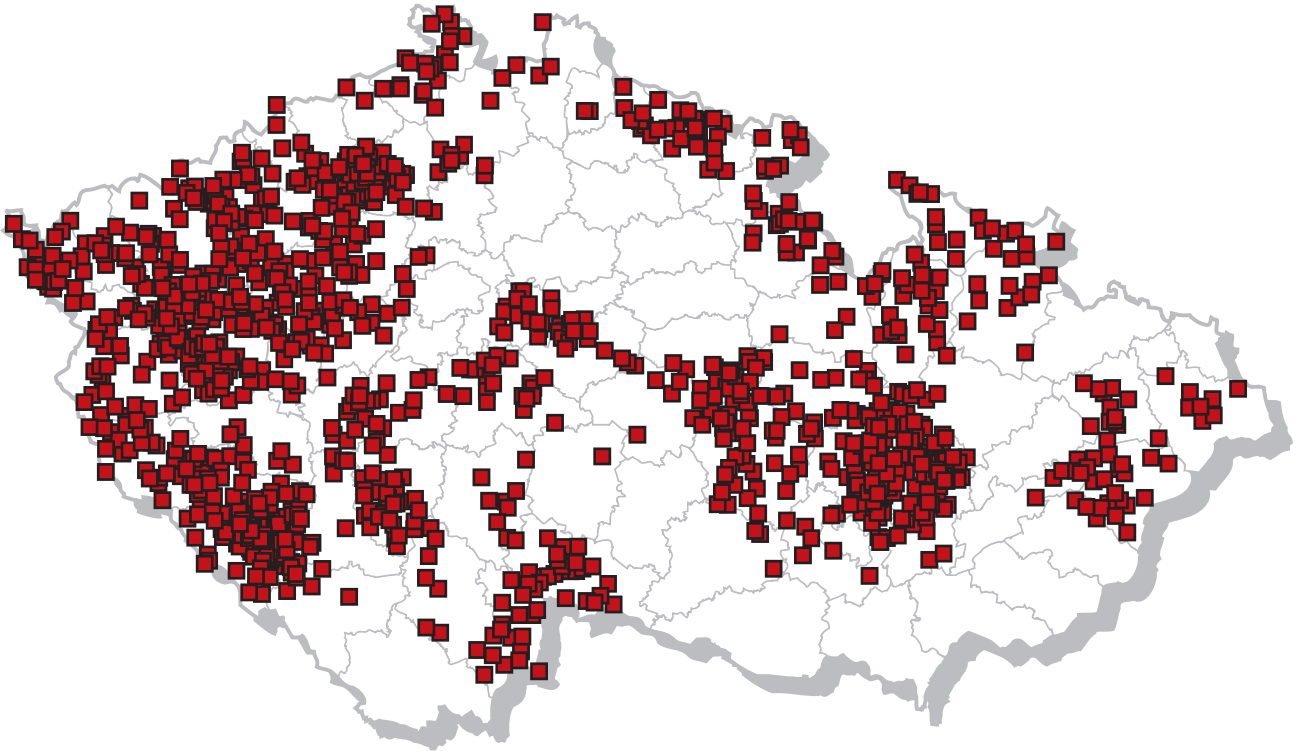
## Distribution of rabies cases in foxes 1947 - 1948



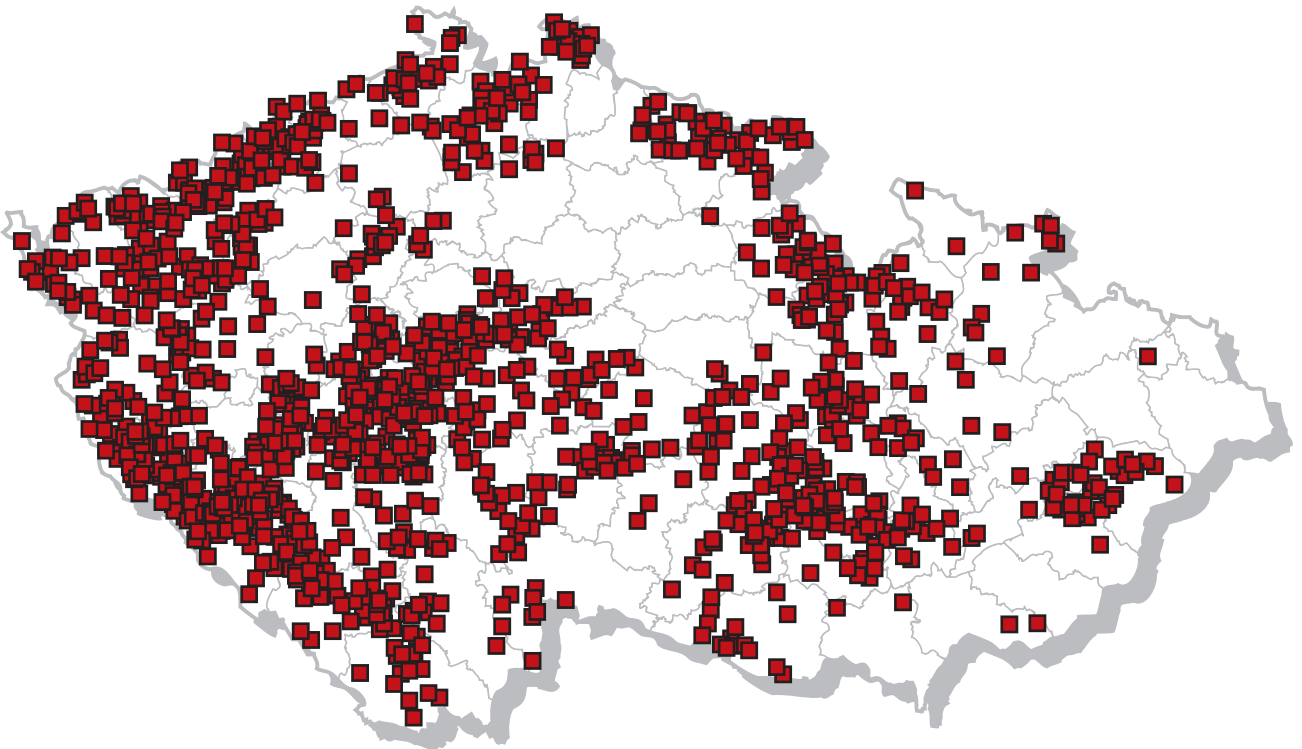
## Spread of sylvatic rabies in the Czech Republic 1975-1980



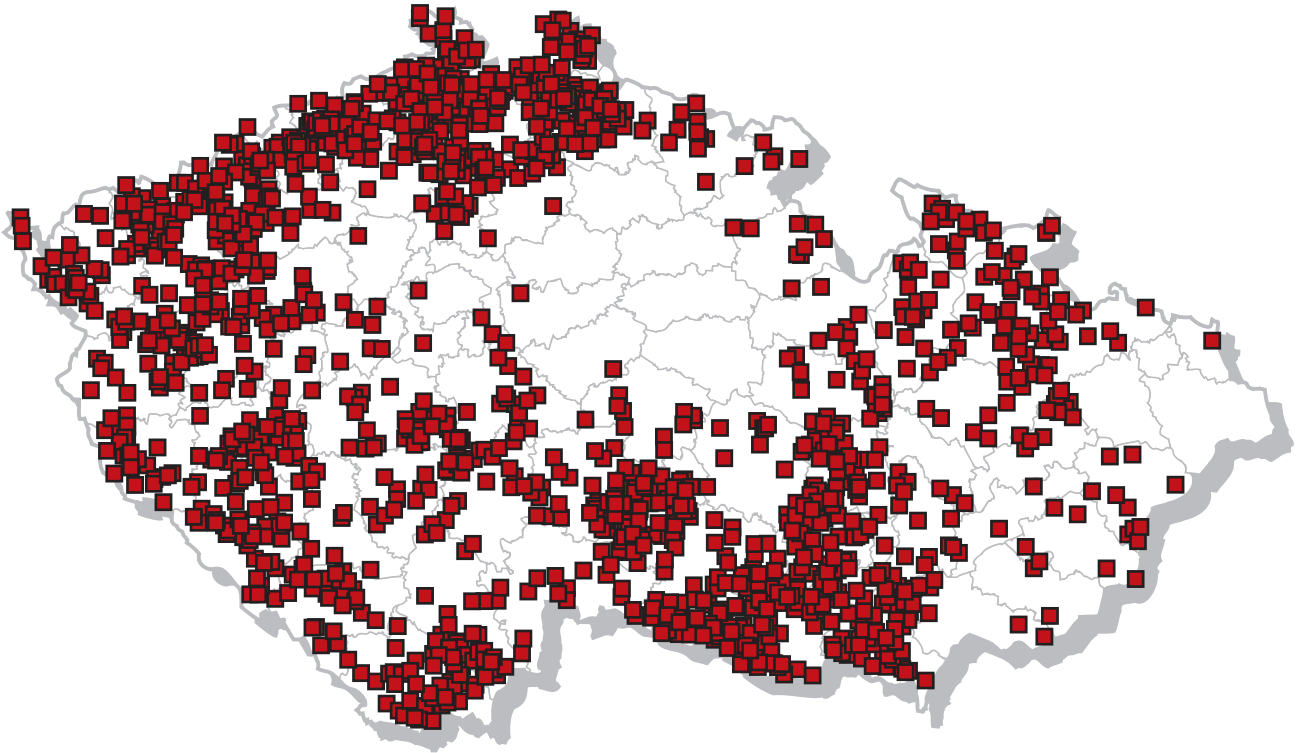
## Rabies cases in 1982



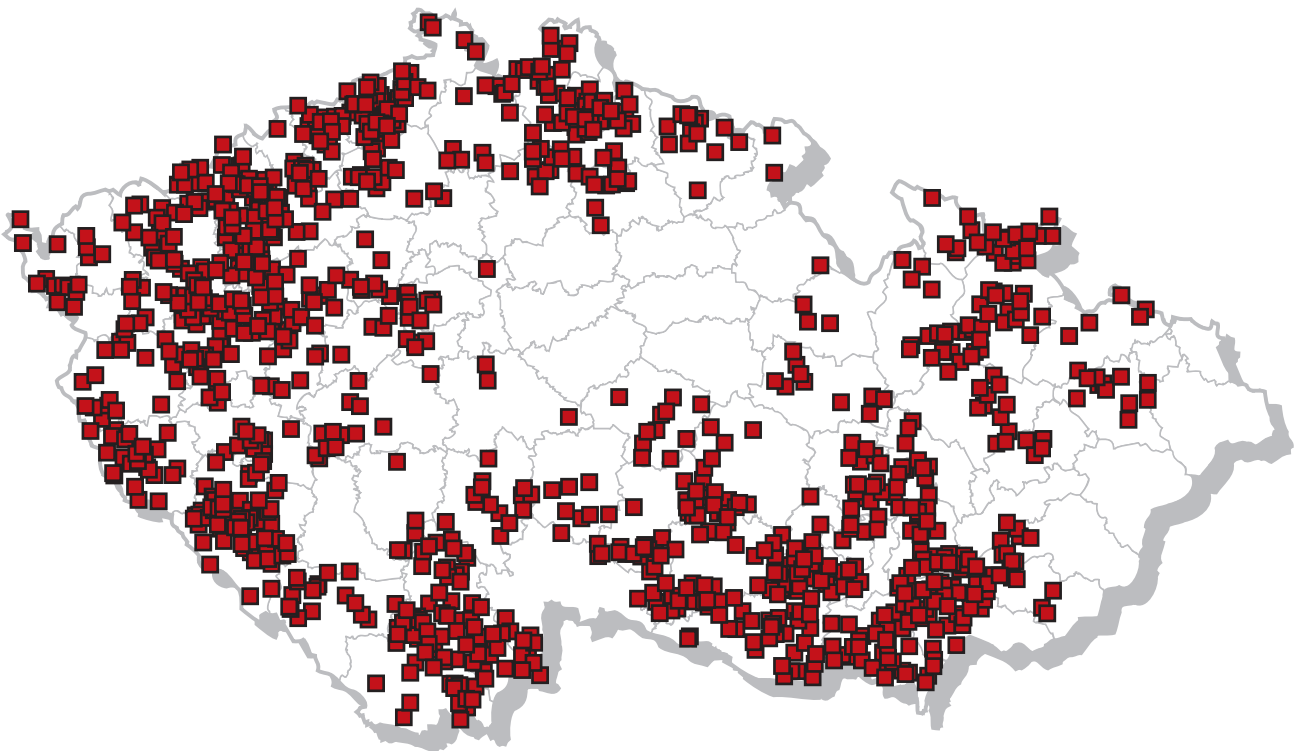
## Rabies cases in 1983



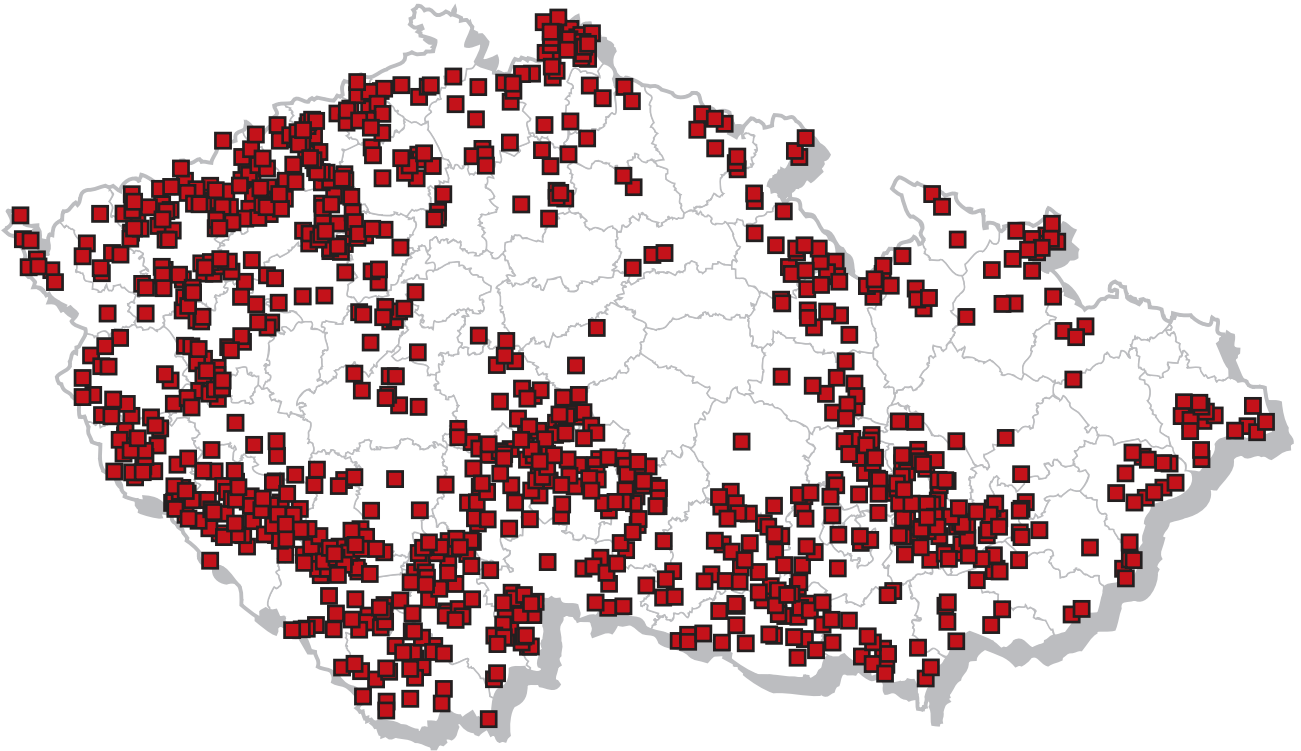
## Rabies cases in 1984



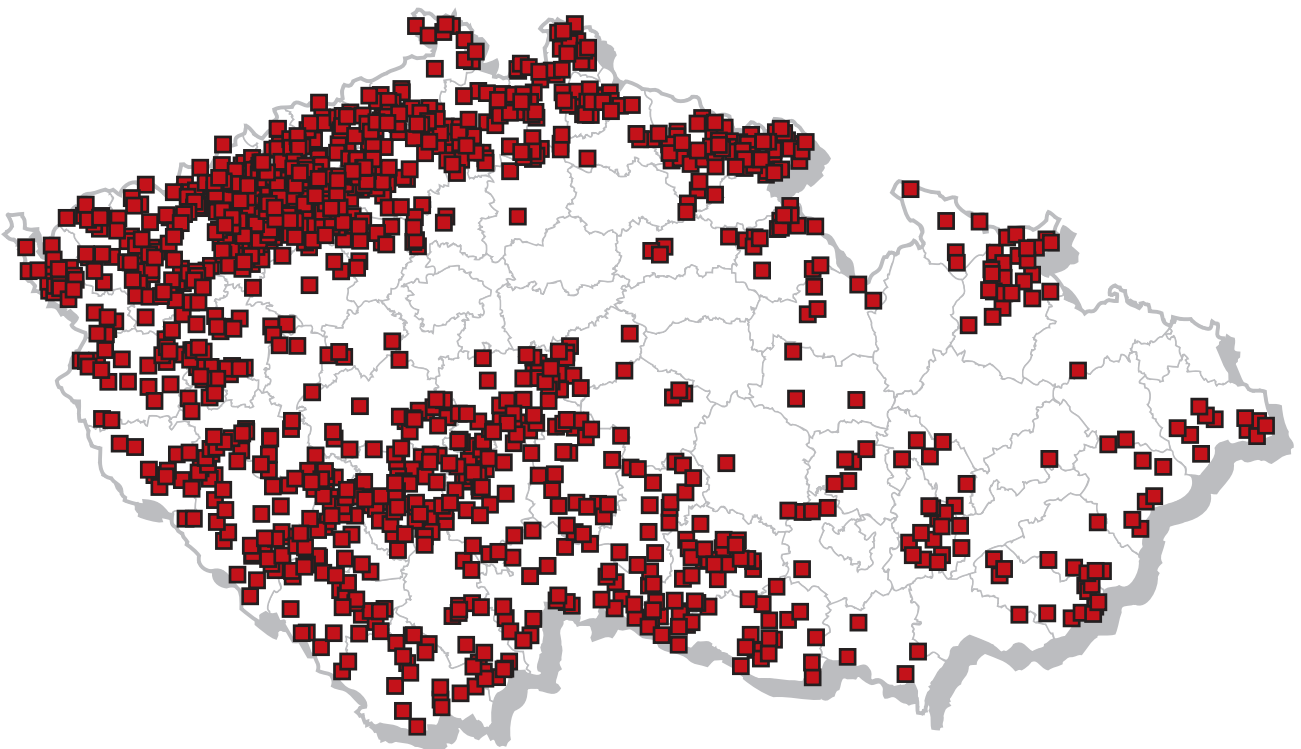
## Rabies cases in 1985



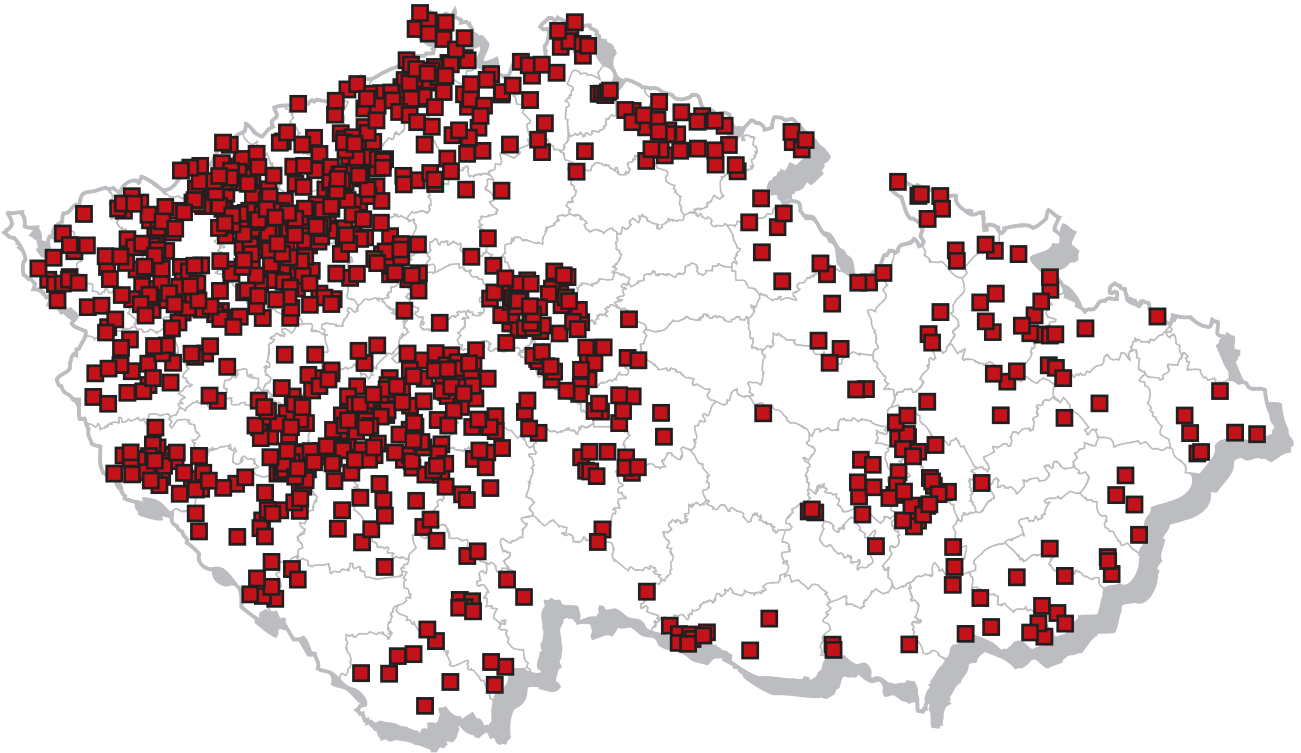
## Rabies cases in 1986



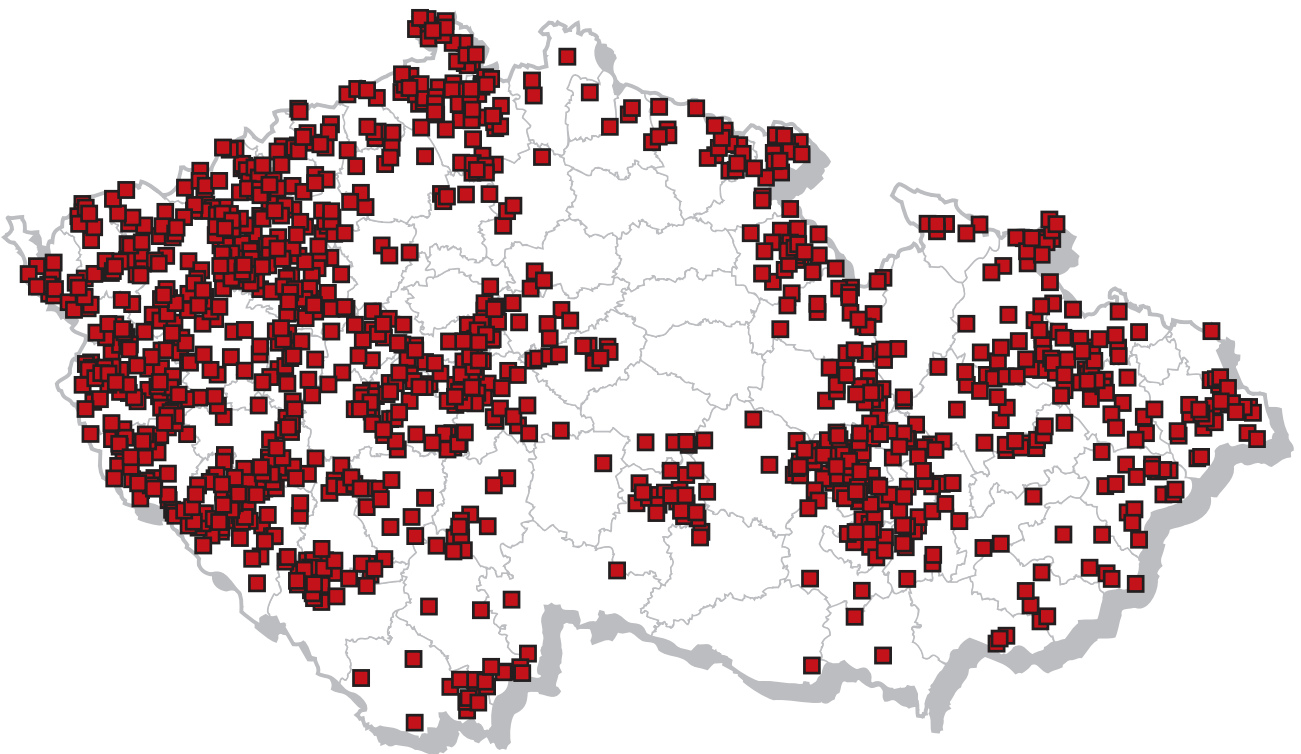
## Rabies cases in 1987



## Rabies cases in 1988

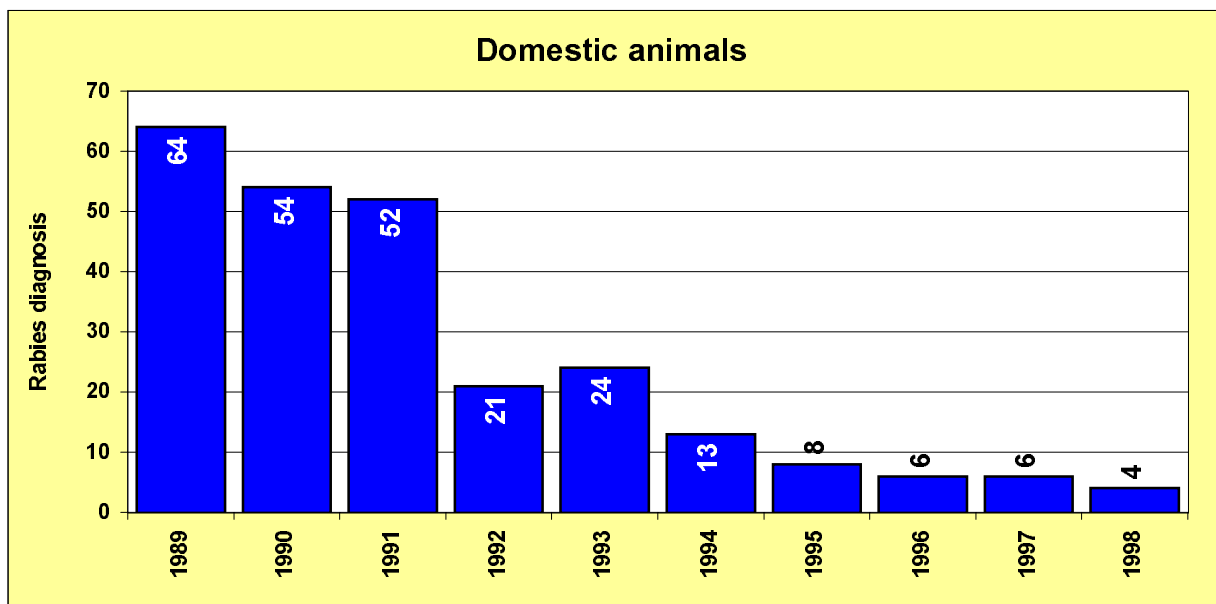
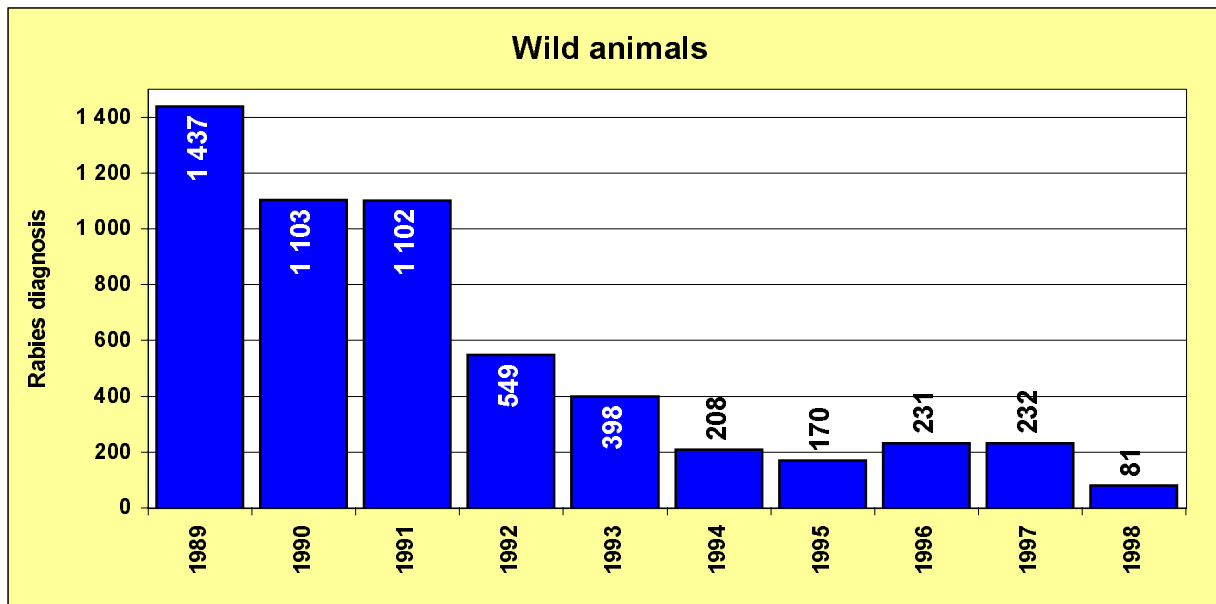


## Rabies cases in 1989



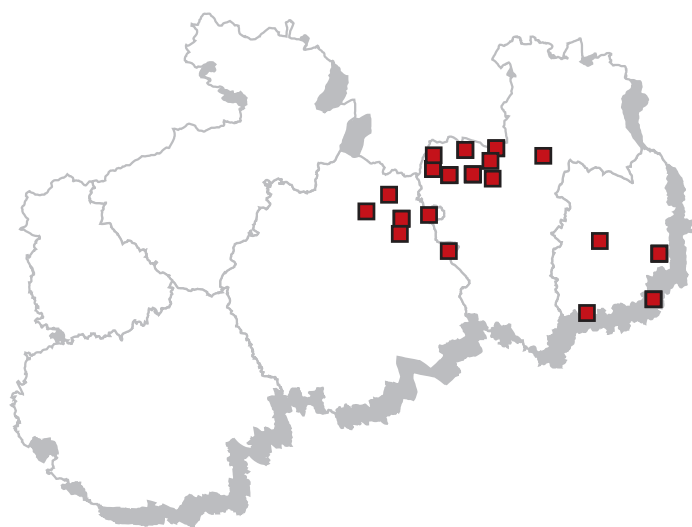


## Rabies incidence in the Czech Republic in 1989-1998

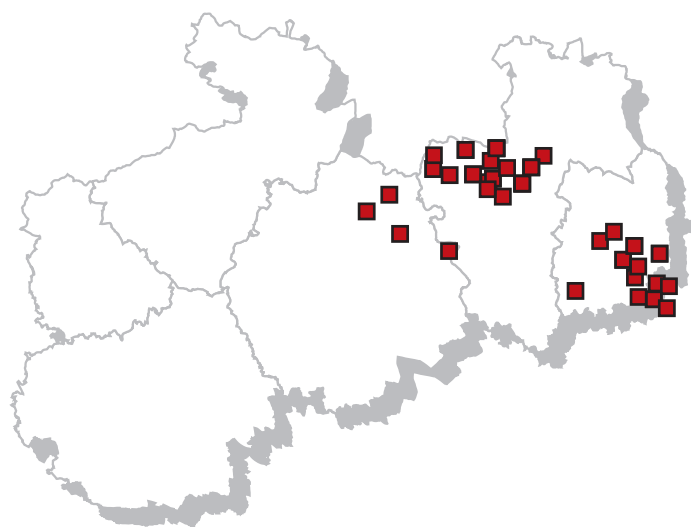


# Spread of rabies in North Bohemia 1995 - 1998

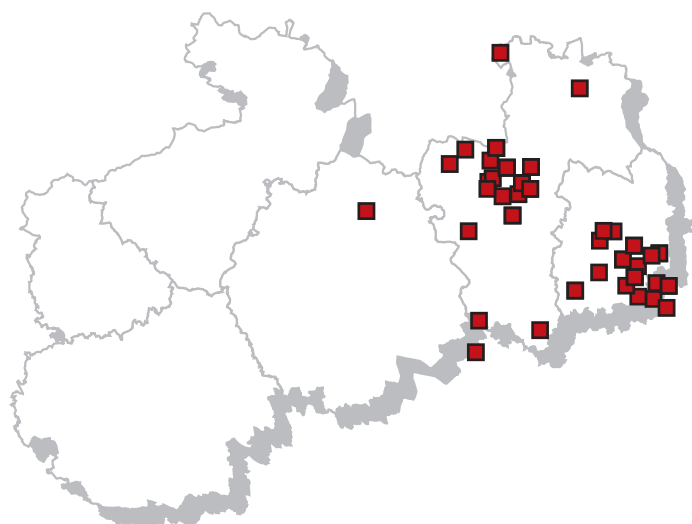
January to June 1995



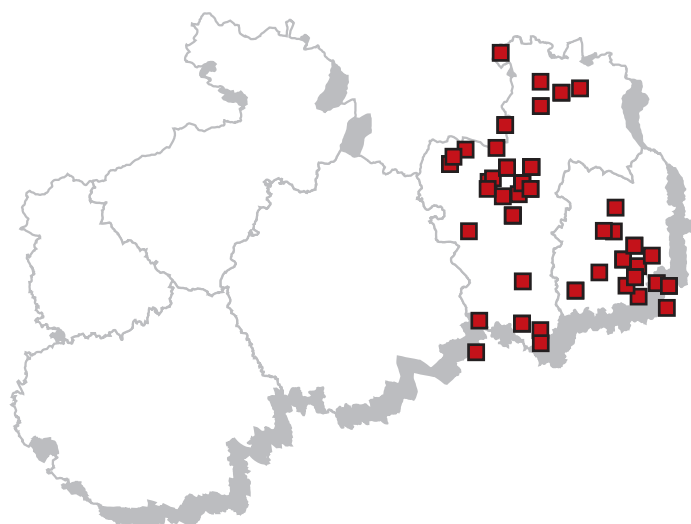
March to August 1995



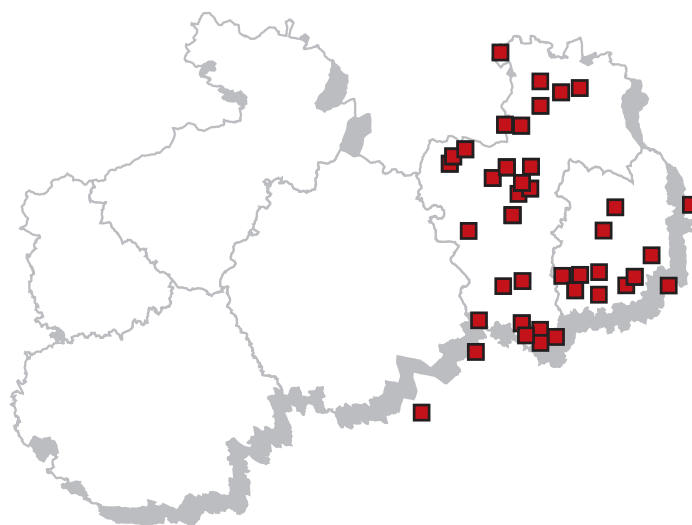
May to October 1995



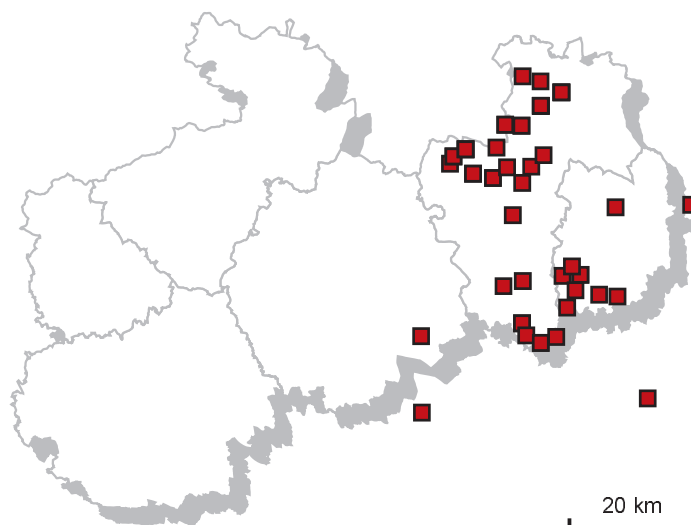
July to December 1995



September 1995 to February 1996



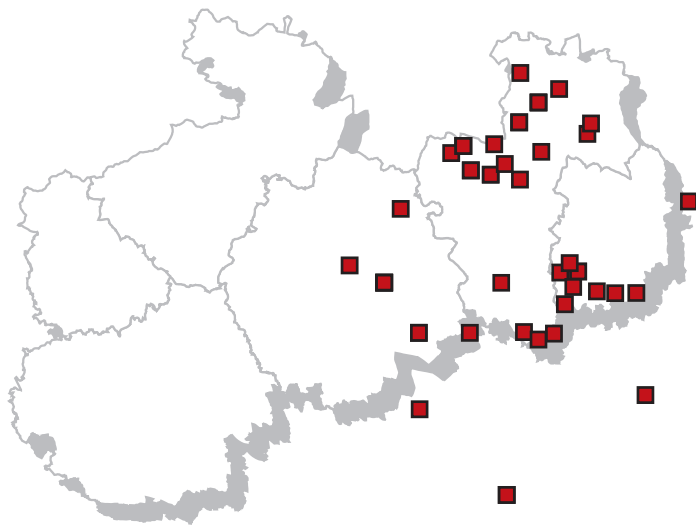
November 1995 to April 1996



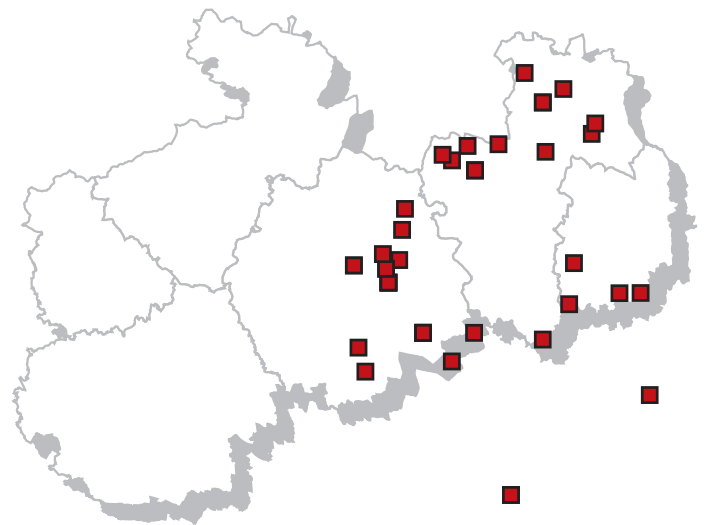
20 km

# Spread of rabies in North Bohemia 1995 - 1998

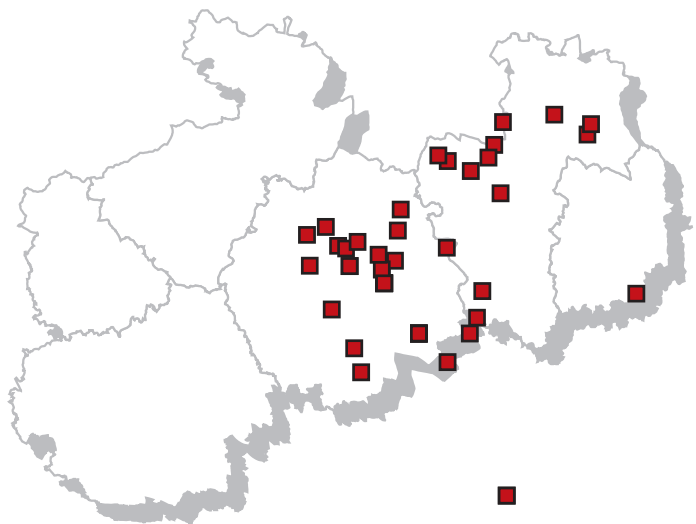
January to June 1996



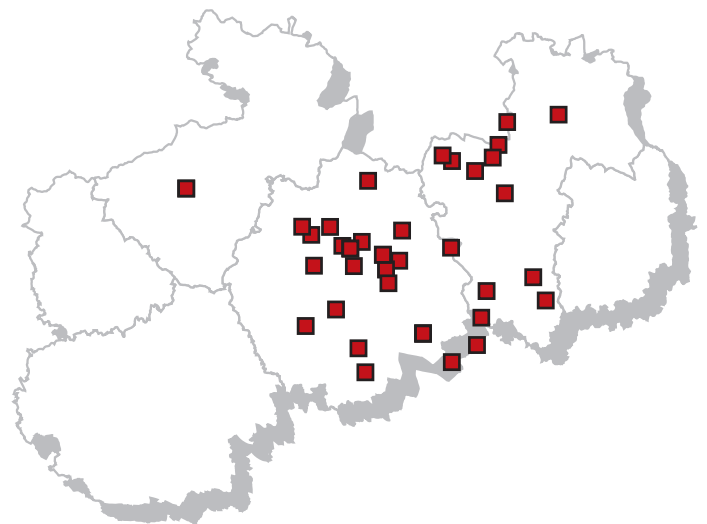
March to August 1996



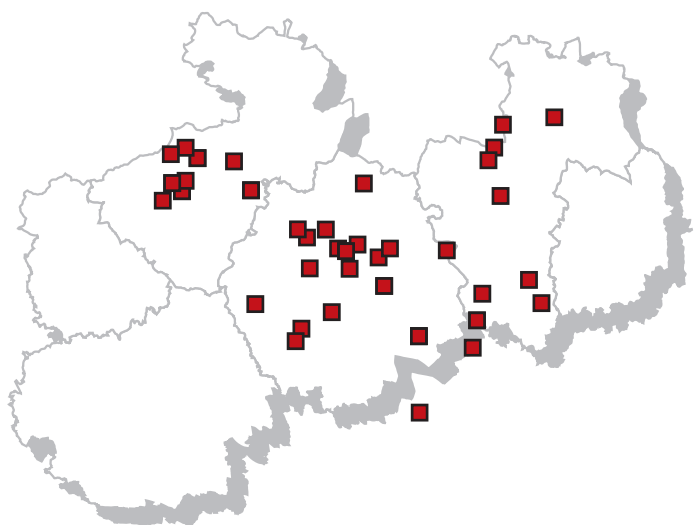
May to October 1996



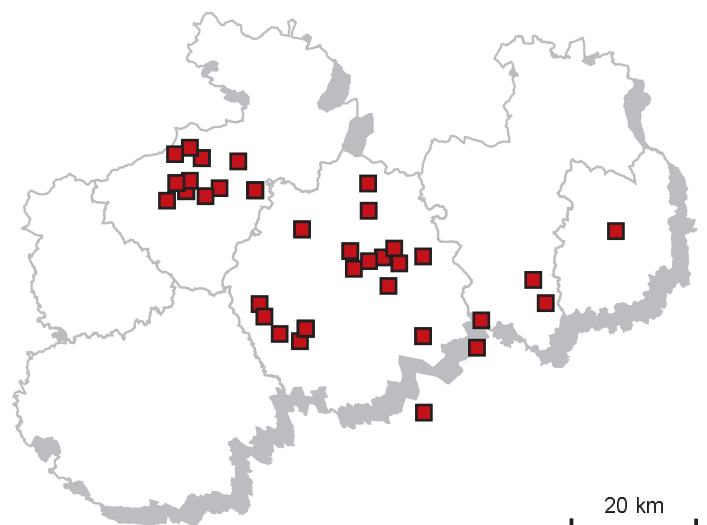
July to December 1996



September 1996 to February 1997



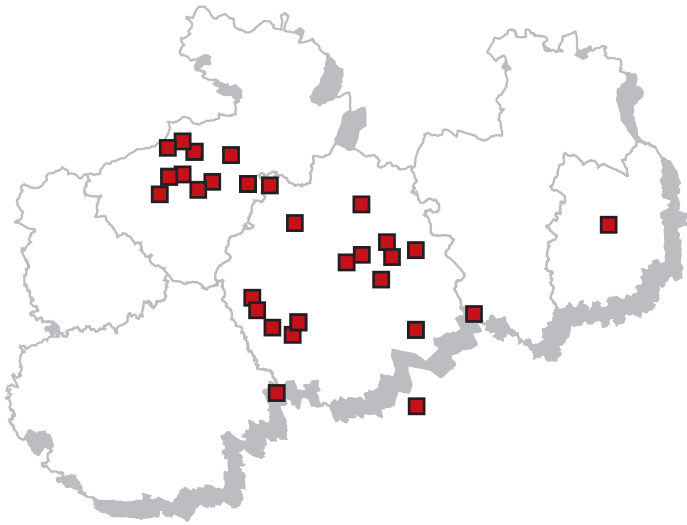
November 1996 to April 1997



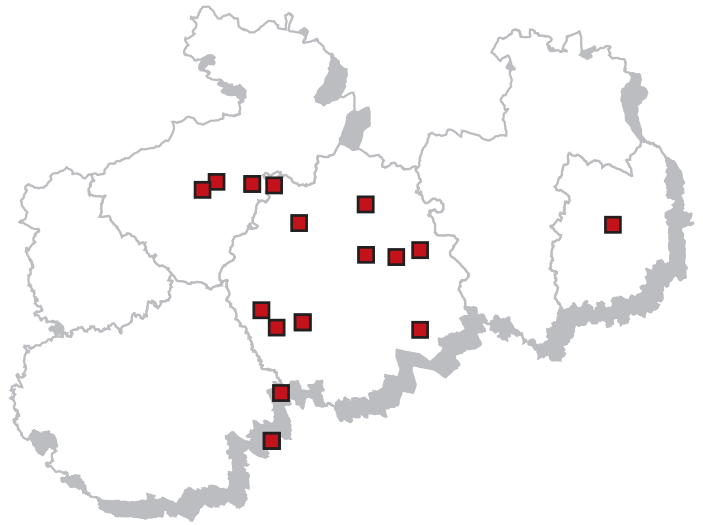
20 km

# Spread of rabies in North Bohemia 1995 - 1998

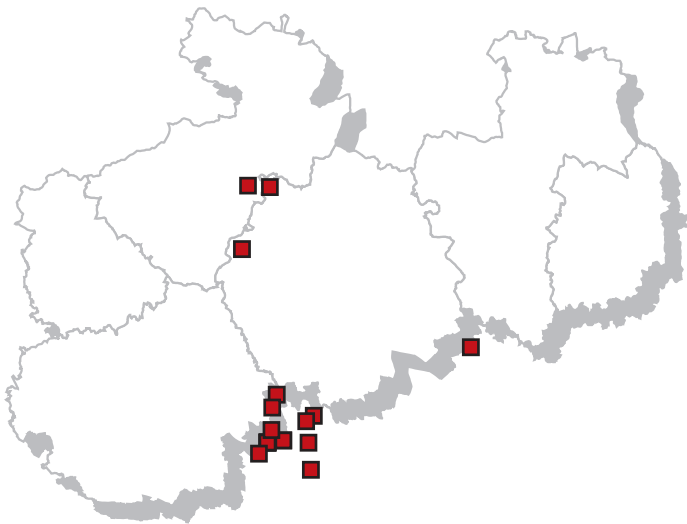
January to June 1997



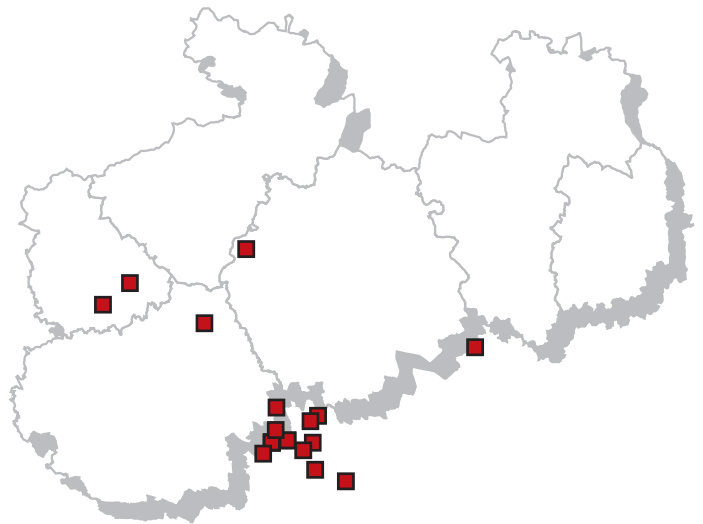
March to August 1997



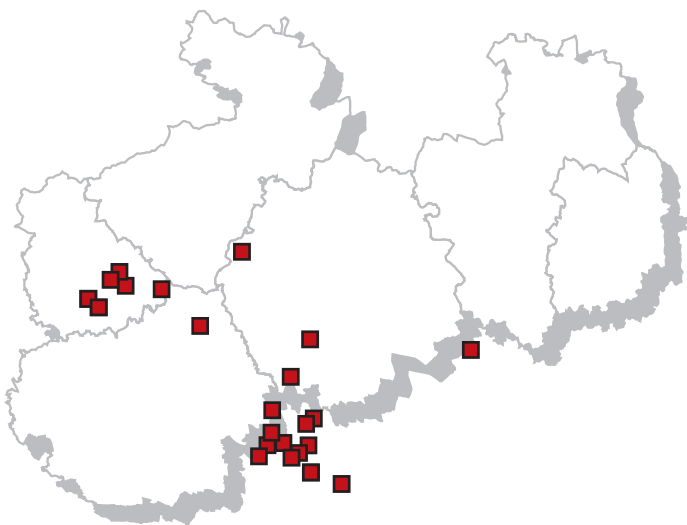
May to October 1997



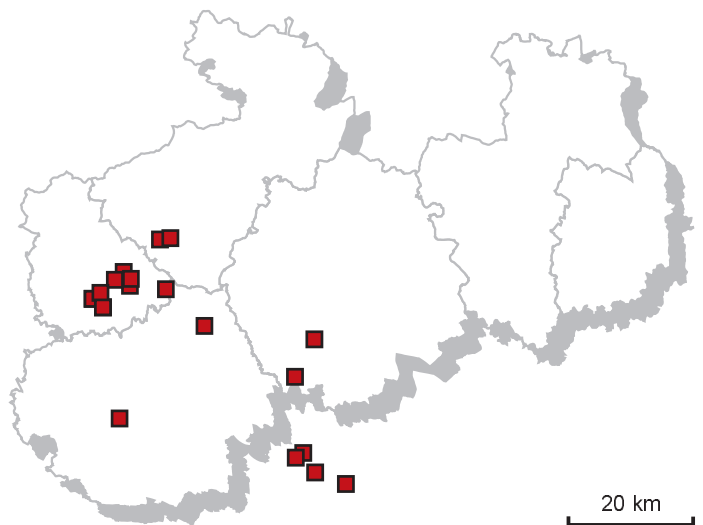
July to December 1997



September 1997 to February 1998



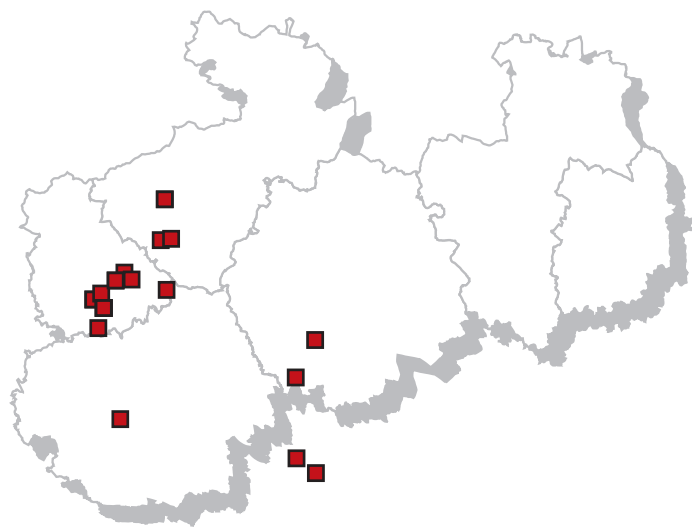
November 1997 to April 1998



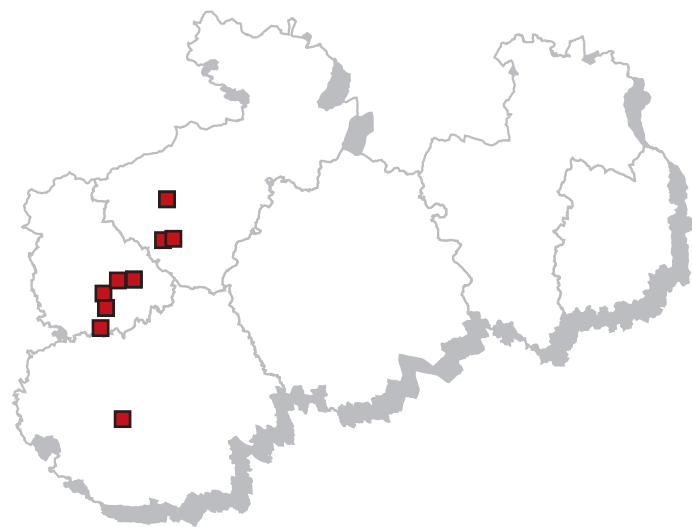
20 km

# Spread of rabies in North Bohemia 1995 - 1998

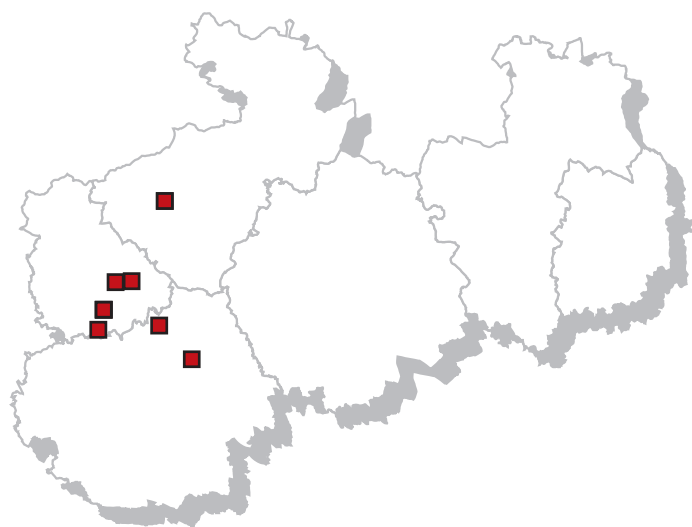
January to June 1998



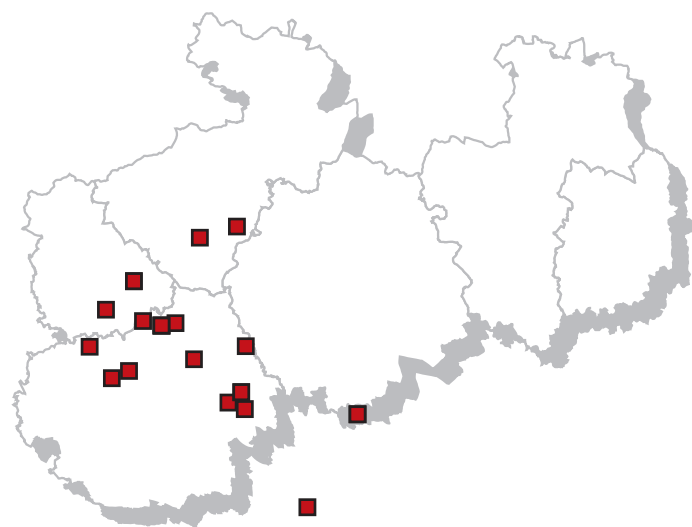
March to August 1998



May to October 1998

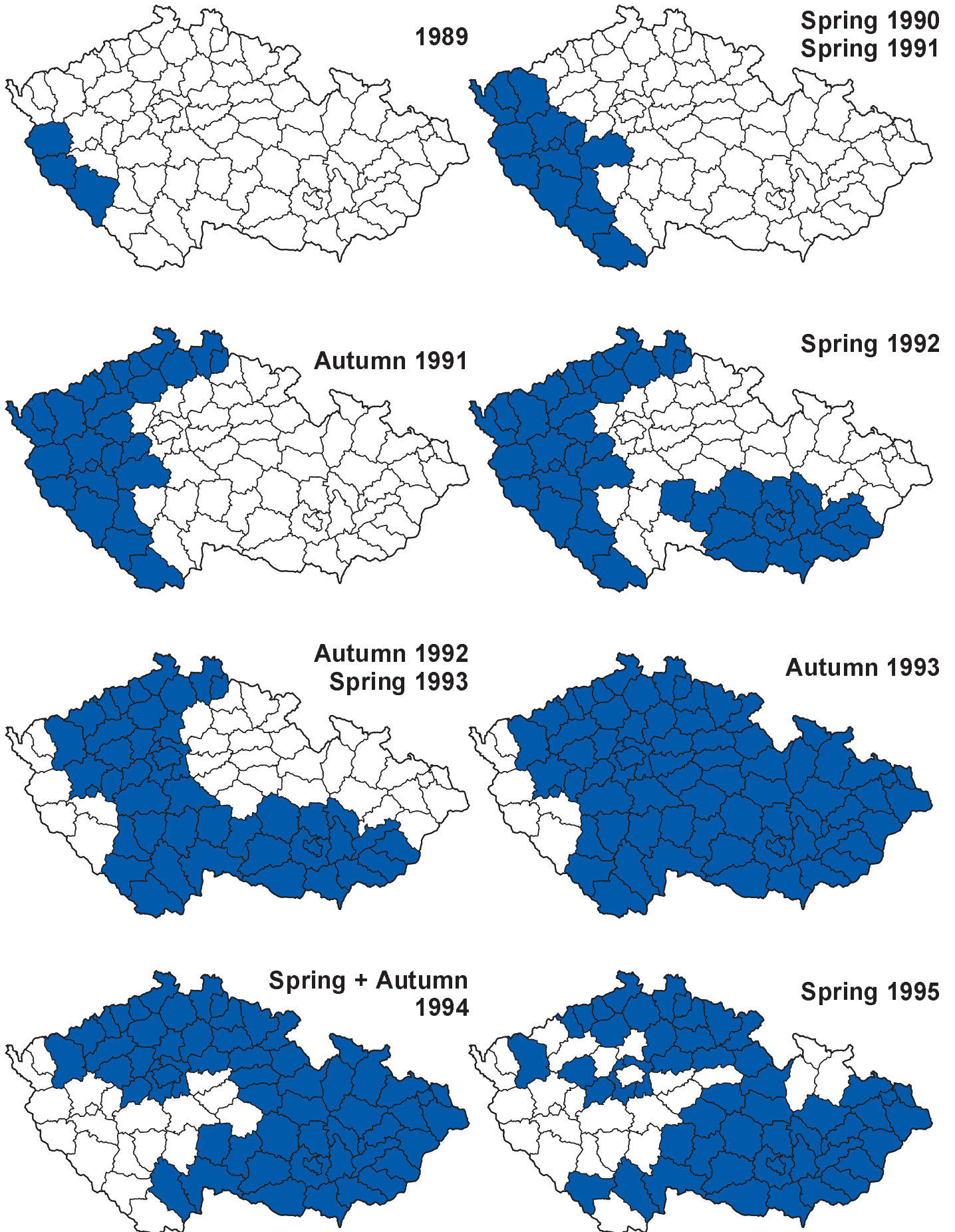


July to December 1998

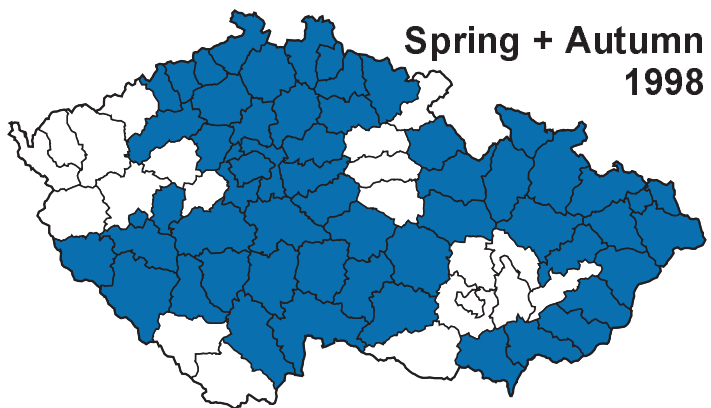
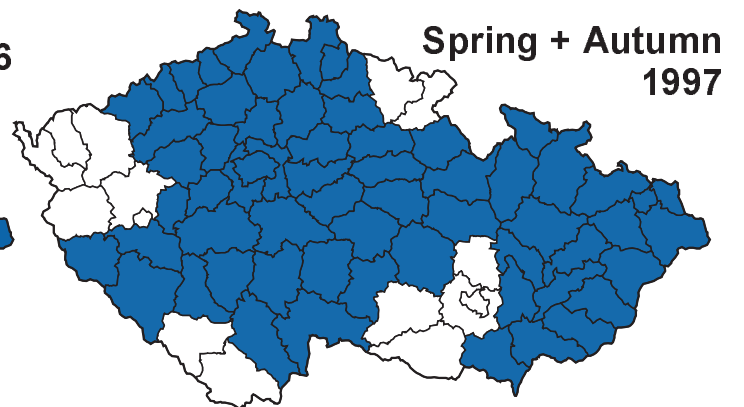
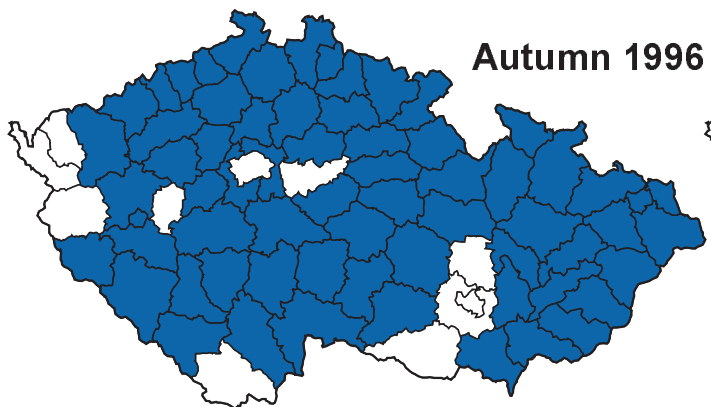
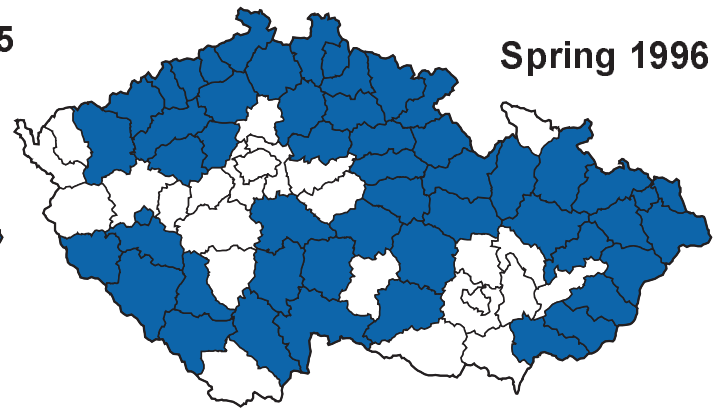
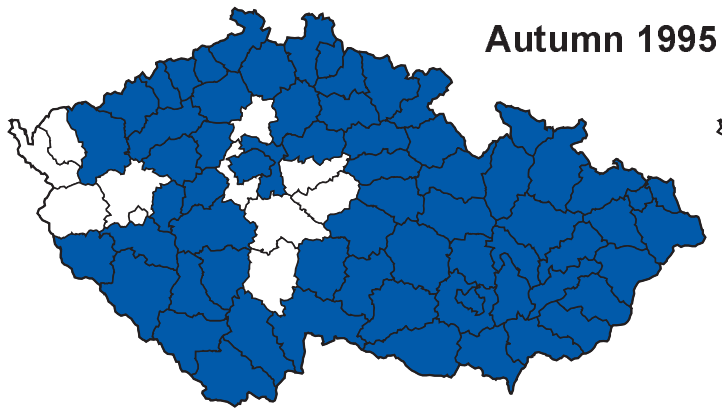


20 km

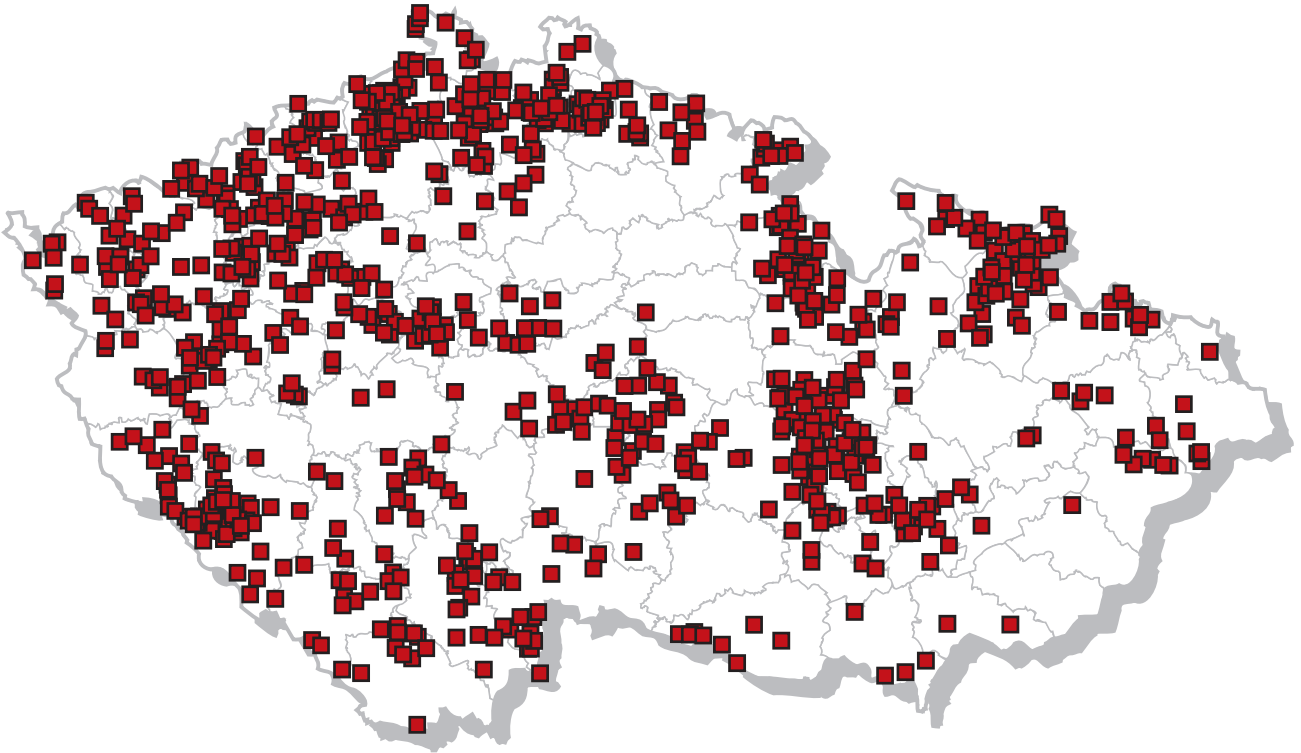
# Oral vaccination of foxes against rabies



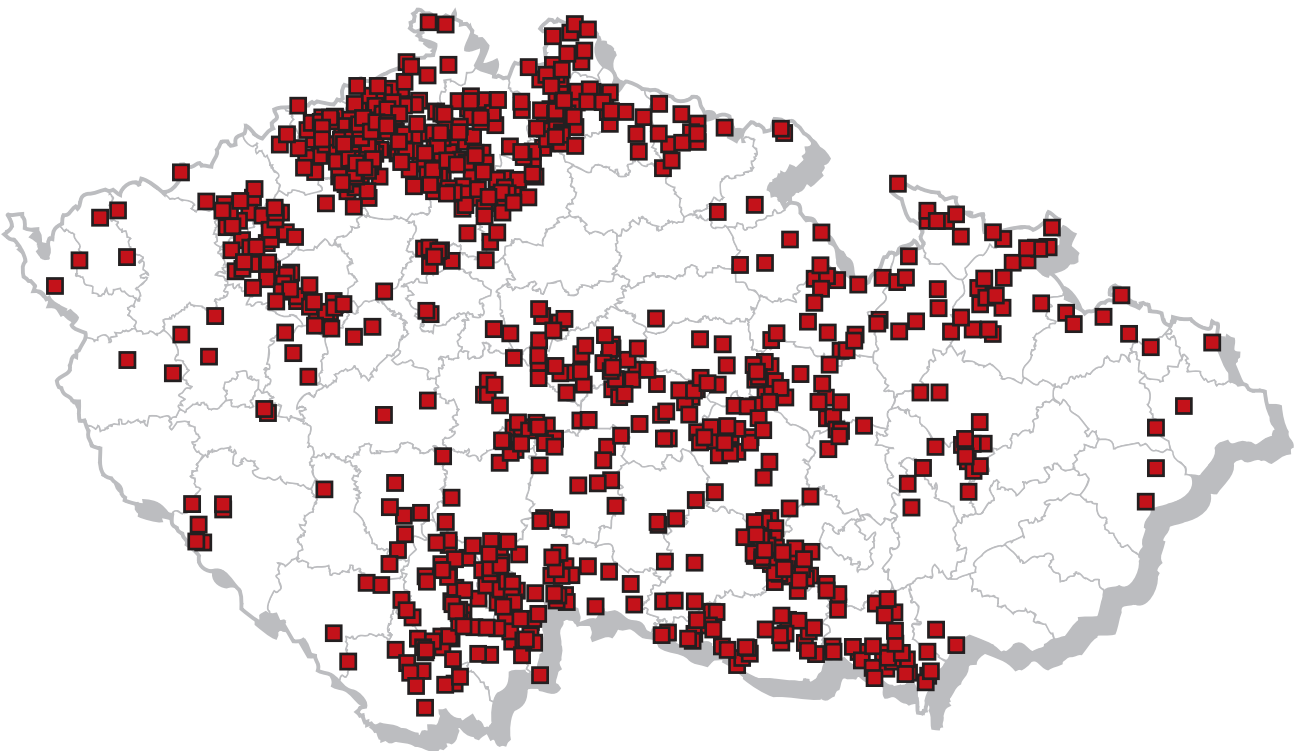
# Oral vaccination of foxes against rabies



## Rabies cases in 1990

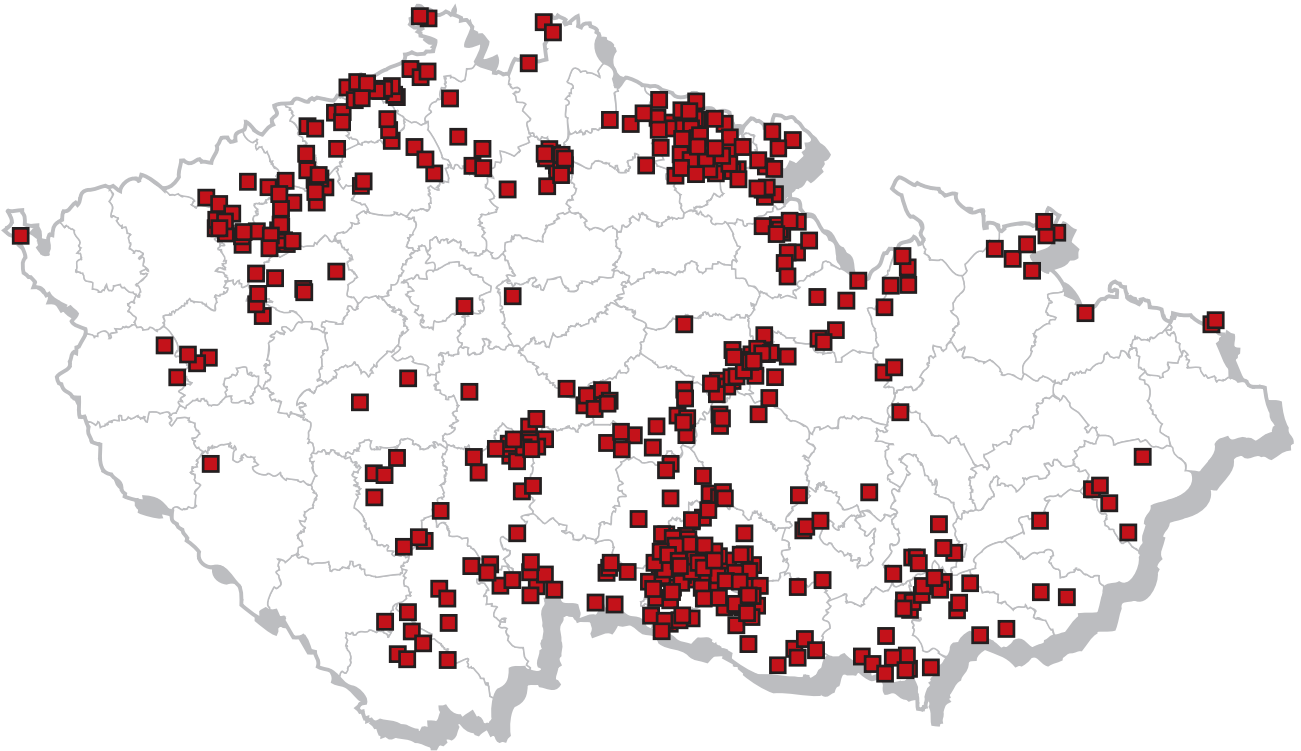


## Rabies cases in 1991

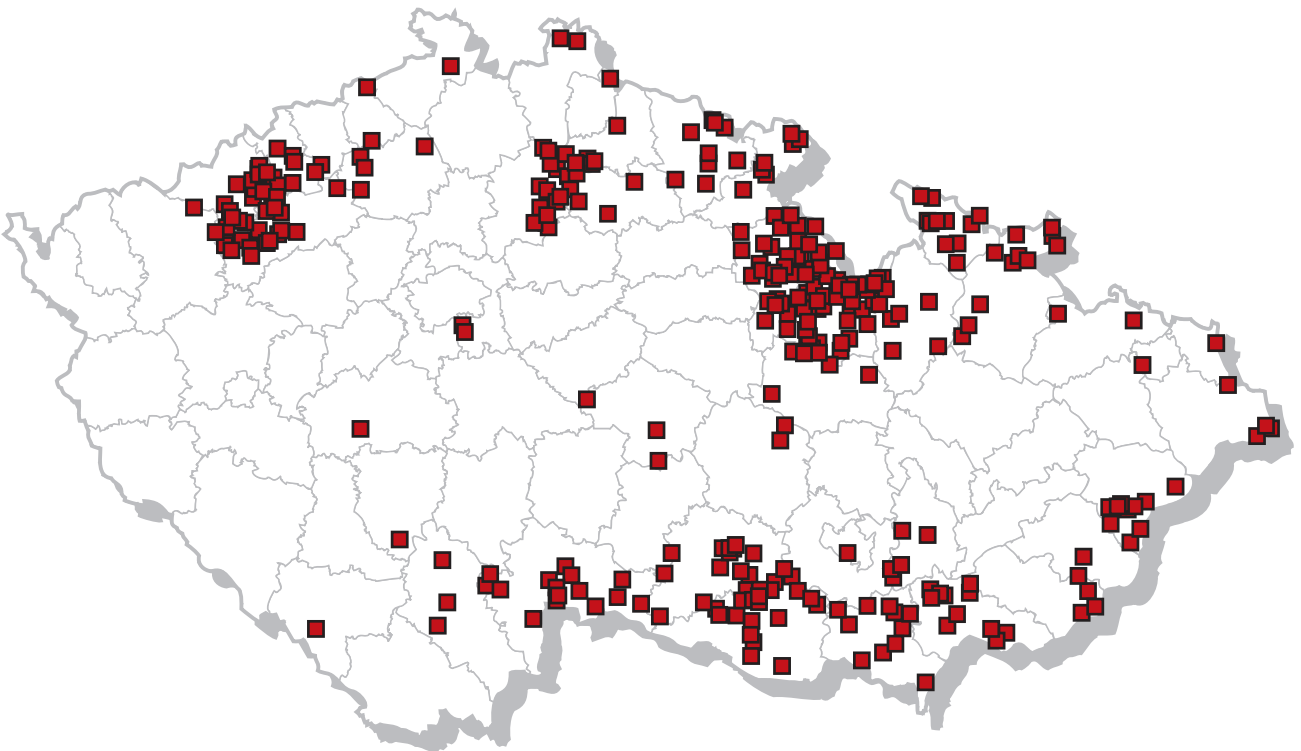




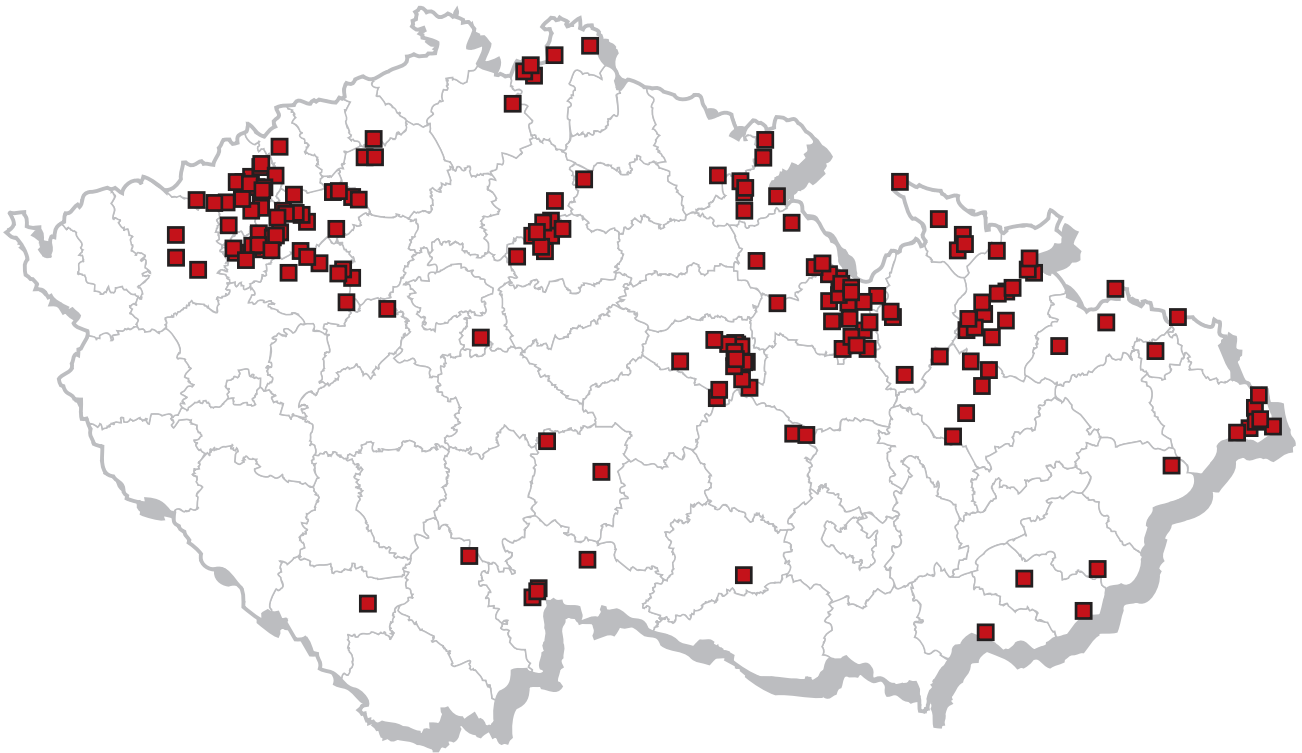
## Rabies cases in 1992



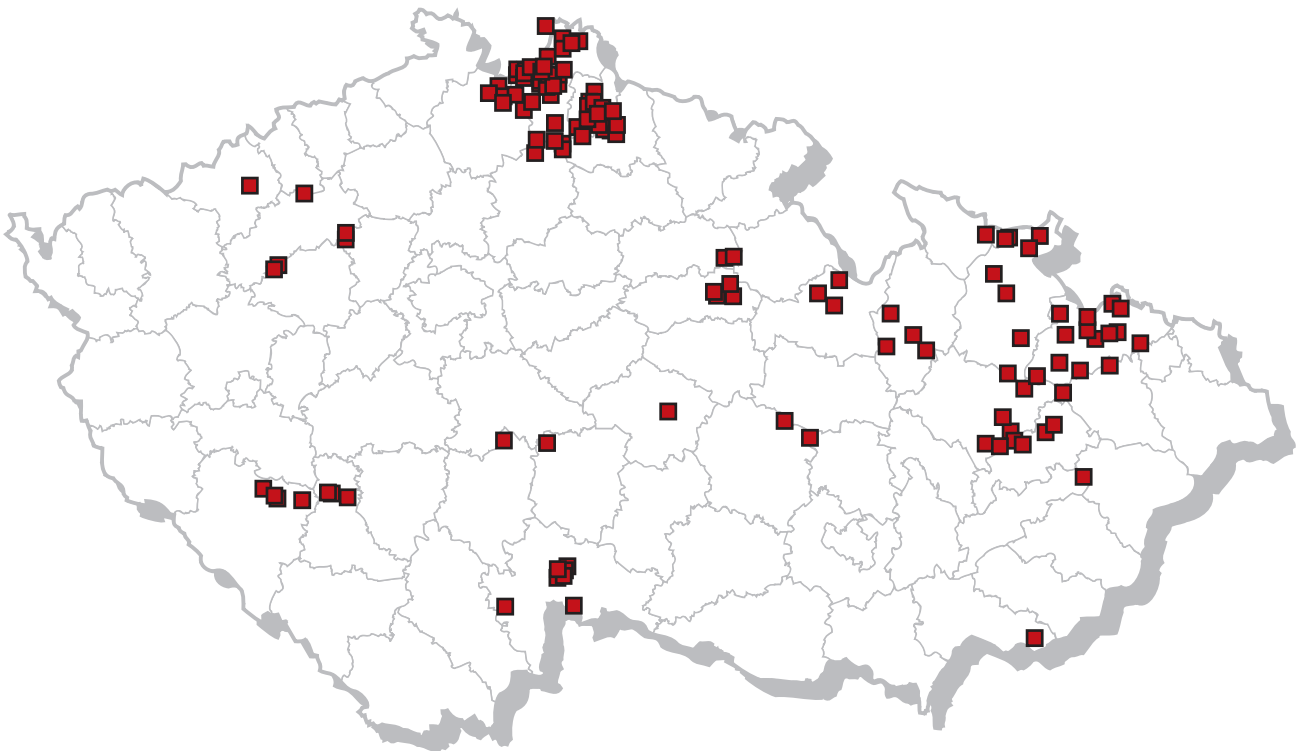
## Rabies cases in 1993



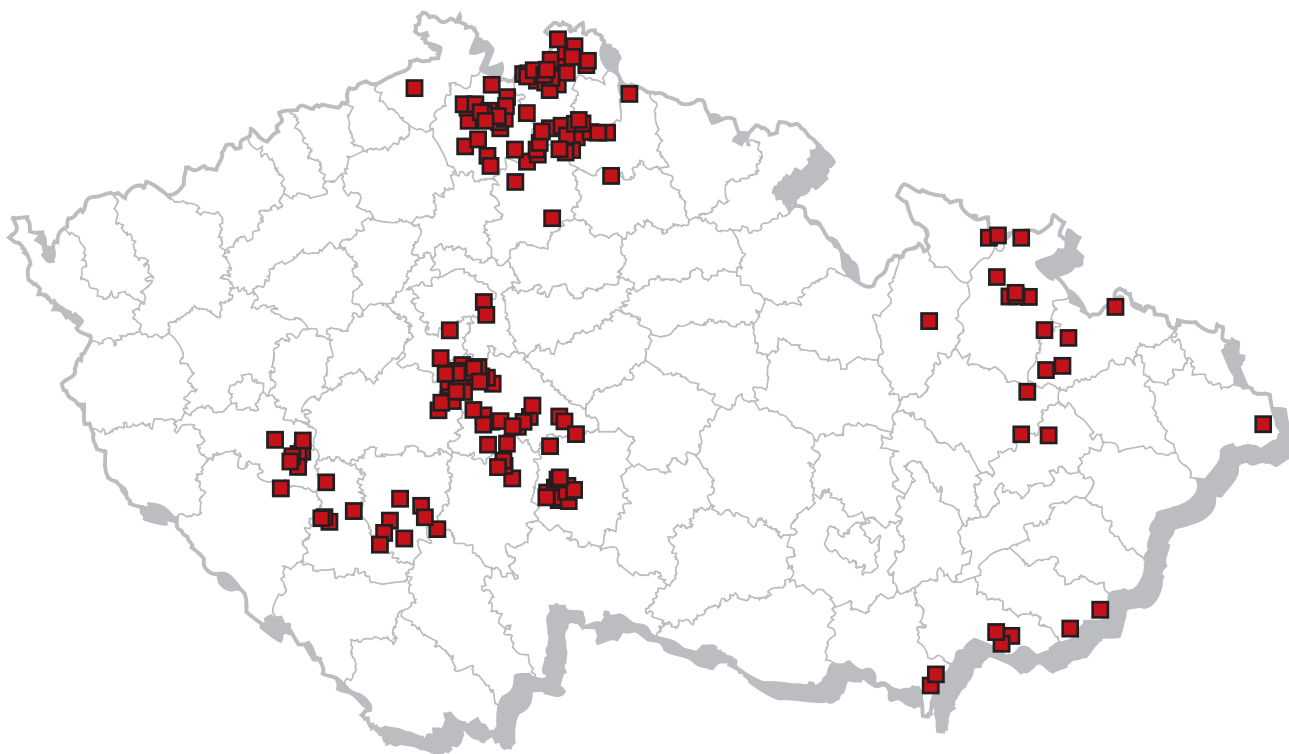
## Rabies cases in 1994



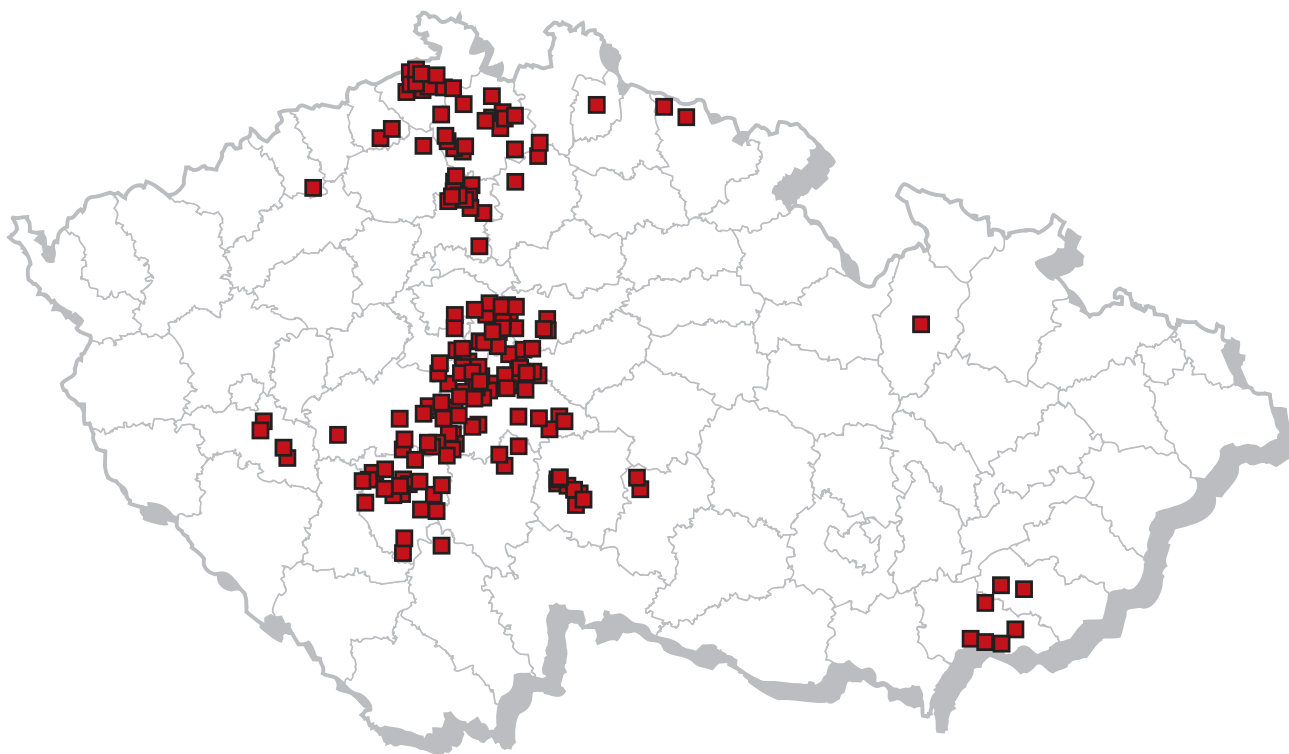
## Rabies cases in 1995



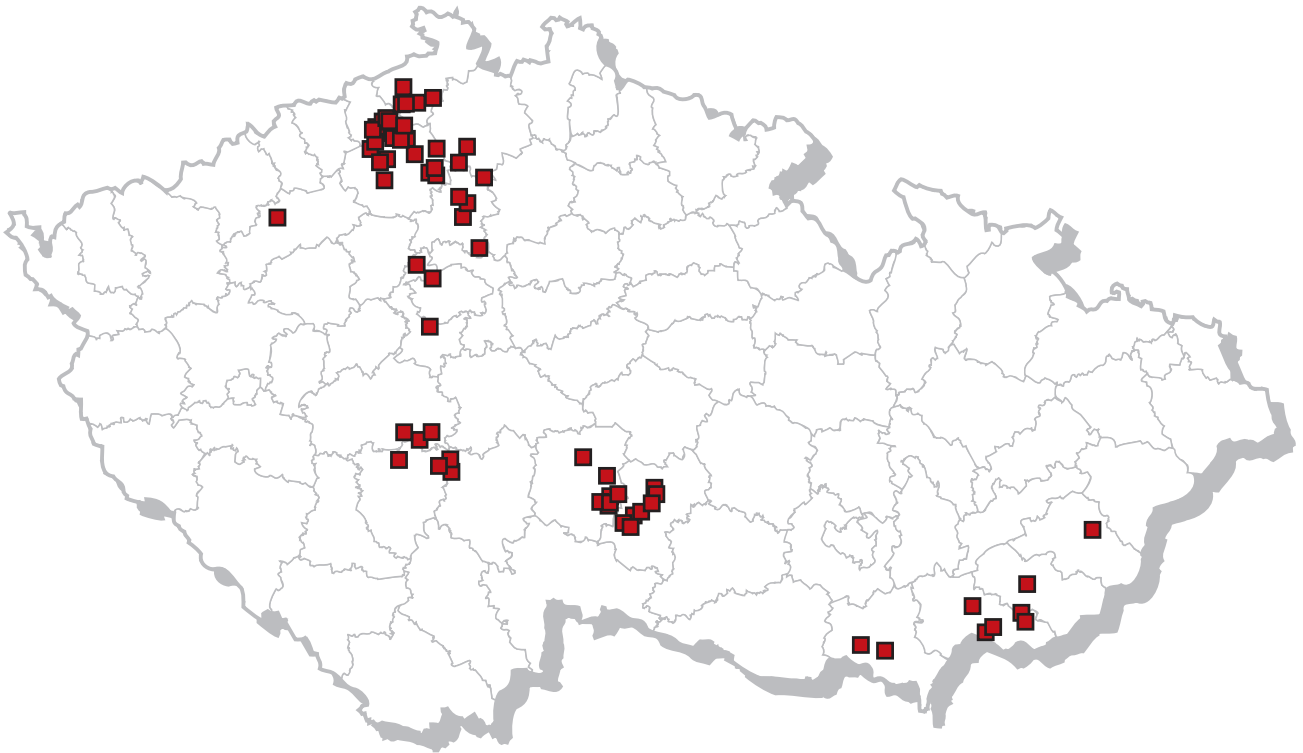
### Rabies cases in 1996



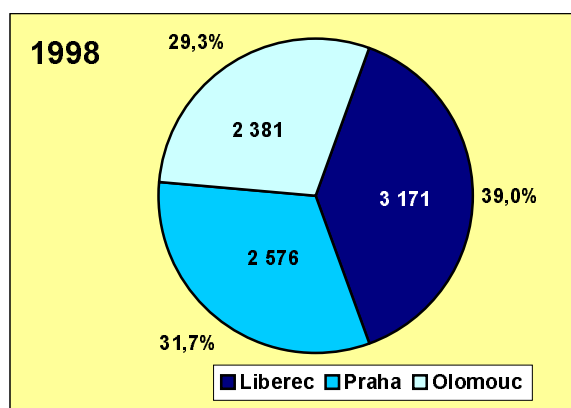
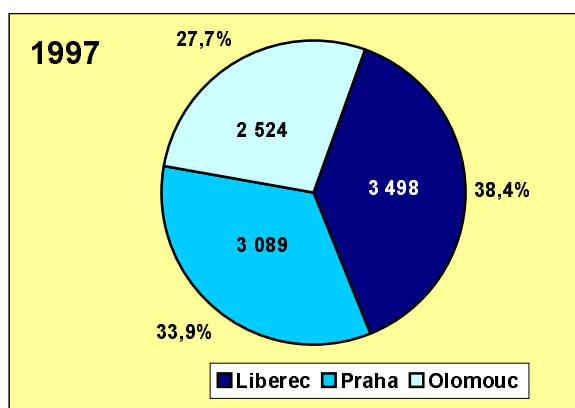
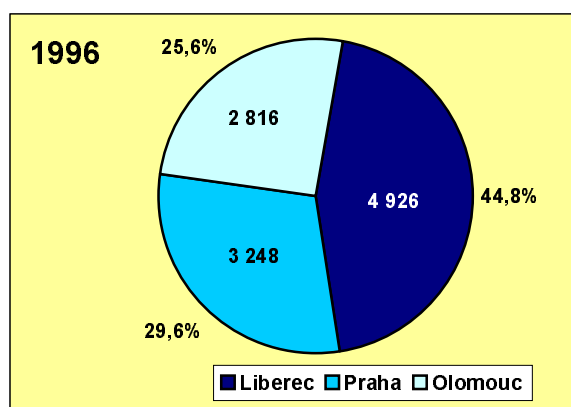
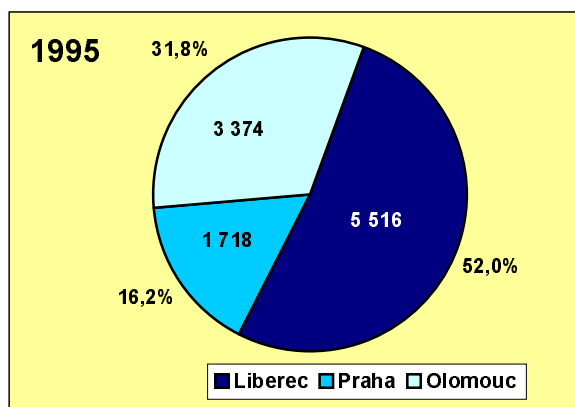
### Rabies cases in 1997



# Rabies cases in 1998



## Participation of particular labs in the total examination number



## Geographical distribution of samples examined for rabies in 1997



## Geographical distribution of samples examined for rabies in 1998



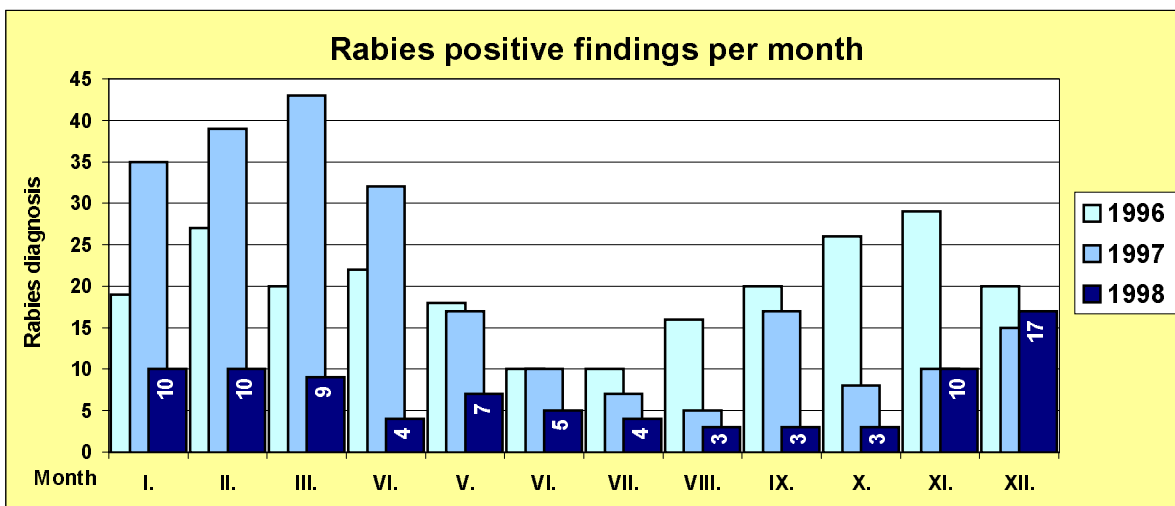
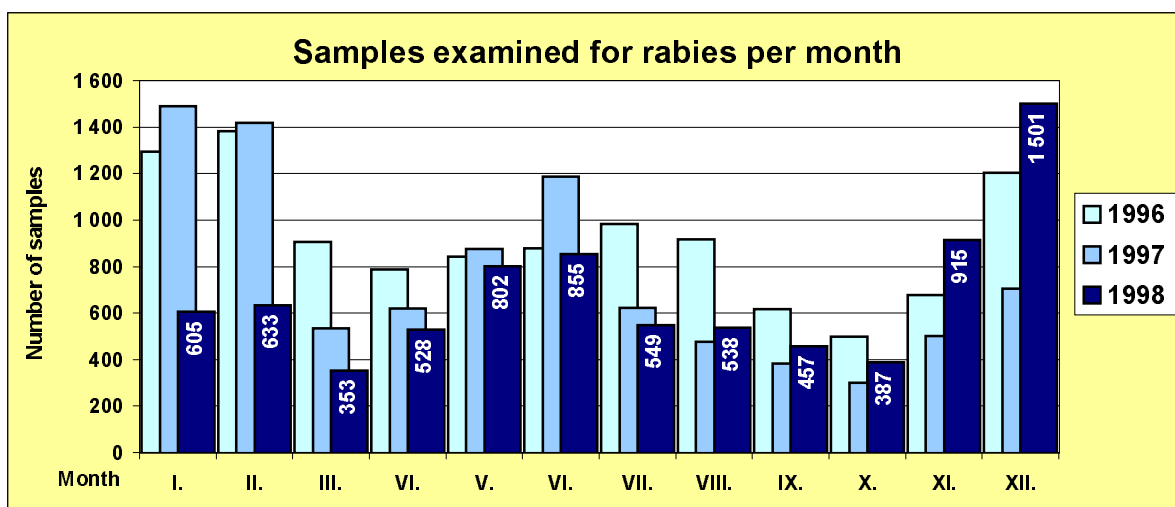
## Review of rabies laboratory examination in the CR 1998

Animal sp.	Number of examined	Number of MIT *)	Unsuitable samples	Number of positive	% of positive
Red fox	5 913	169	80	77	1,3
Marten	302	68	2	1	0,3
Roe-deer	189	30	0	2	1,1
Norwegian rat	52	37	2	0	0,0
Badger	40	3	2	1	2,5
Com. vole	31	28	0	0	0,0
House mouse	29	15	0	0	0,0
Brown hare	25	11	0	0	0,0
Weasel sp.	25	21	0	0	0,0
Wild boar	21	5	0	0	0,0
Qquirrel	14	6	0	0	0,0
European mole	13	11	0	0	0,0
Bat sp.	11	9	0	0	0,0
Polecat	11	5	0	0	0,0
Hedgehog	9	4	0	0	0,0
Hamsher	6	4	0	0	0,0
Fallow deer	5	0	0	0	0,0
Water vole	3	3	0	0	0,0
Black rat	3	3	0	0	0,0
Musk rat	3	2	0	0	0,0
Red deer	3	1	0	0	0,0
Racoon dog	3	0	0	0	0,0
Wild rabbit	2	0	0	0	0,0
Pray birds	2	1	0	0	0,0
Mouflon	2	0	0	0	0,0
Mouse min.	1	1	0	0	0,0
Clethrionomys sp.	1	1	0	0	0,0
Glis sp.	1	1	0	0	0,0
Volf	1	0	0	0	0,0
Sorex sp.	1	0	0	0	0,0
Pitimys sp.	1	1	0	0	0,0
<b>Wild animals</b>	<b>6 723</b>	<b>440</b>	<b>86</b>	<b>81</b>	<b>1,2</b>
Cat	707	506	7	3	0,4
Dog	577	418	0	1	0,2
Ferret	33	15	0	0	0,0
Hamsher	21	12	0	0	0,0
Guinea pig	13	7	0	0	0,0
Cattle	10	0	0	0	0,0
Rabbit	7	4	0	0	0,0
Hen	6	4	0	0	0,0
Phodopus sp.	6	0	0	0	0,0
Goat	6	2	0	0	0,0
White mouse	5	2	1	0	0,0
ZOO animals	2	0	0	0	0,0
White rat	2	1	0	0	0,0
Ship	2	0	0	0	0,0
Goose	1	0	0	0	0,0
Polar fox	1	0	0	0	0,0
Vietnam pig	1	0	0	0	0,0
Pig	1	1	0	0	0,0
Chinchil	1	1	0	0	0,0
Octodon sp.	1	1	0	0	0,0
Nutria	1	0	0	0	0,0
<b>Domestic animals</b>	<b>1 404</b>	<b>974</b>	<b>8</b>	<b>4</b>	<b>0,3</b>
<b>TOTAL</b>	<b>8 127</b>	<b>1 414</b>	<b>94</b>	<b>85</b>	<b>1,0</b>

\*) MIT mouse inoculation test

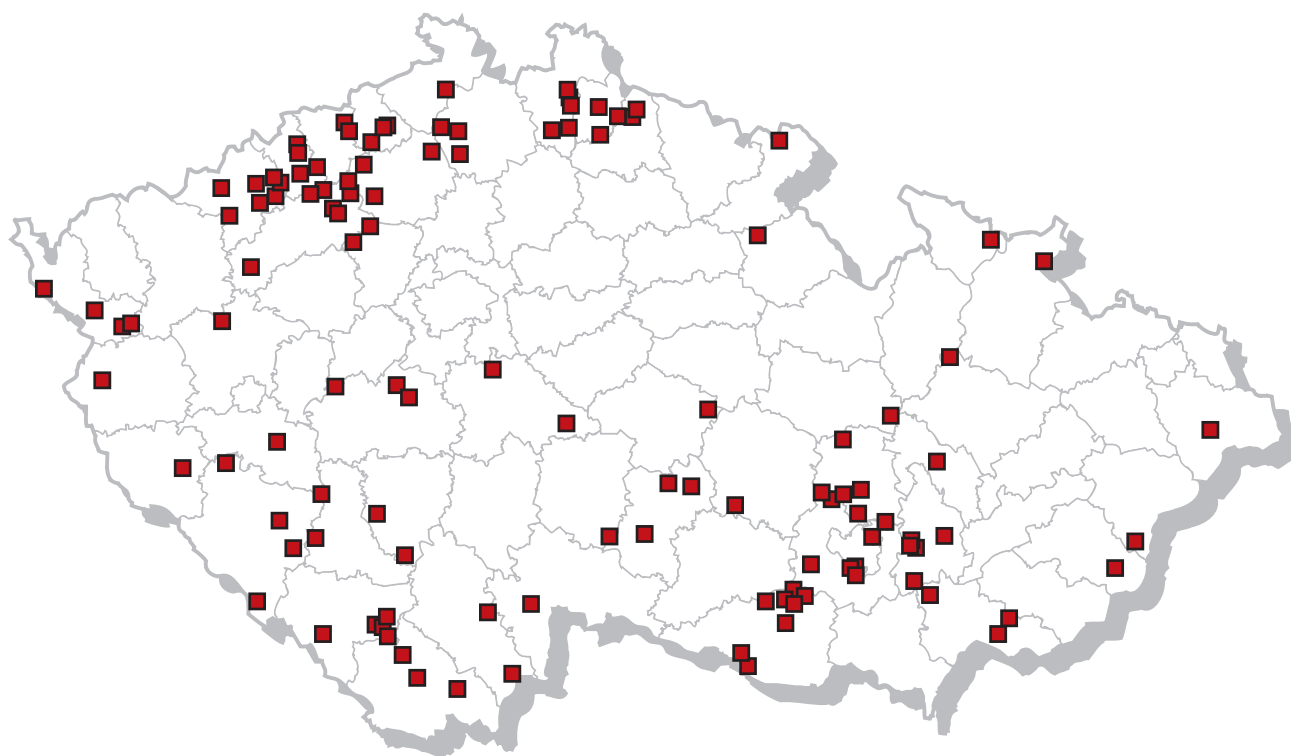
## Rabies cases in the Czech Republic per month - 1998

Month/Animal	I.	II.	III.	VI.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	celkem	%
Fox	10	10	7	4	7	3	2	3	3	3	10	15	77	90,5
Roe-deer	-	-	-	-	-	-	-	-	-	-	-	-	2	2,4
Marten sp.	-	-	-	-	-	-	1	-	-	-	-	-	1	1,2
Badger	-	-	-	-	-	1	-	-	-	-	-	-	1	1,2
Wild animals	10	10	7	4	7	4	3	3	3	3	10	17	81	95,3
Cat	-	-	1	-	-	1	1	-	-	-	-	-	3	3,5
Dog	-	-	1	-	-	-	-	-	-	-	-	-	1	1,2
Dom. animals	-	-	2	-	-	1	1	-	-	-	-	-	4	4,7
<b>TOTAL</b>	<b>10</b>	<b>10</b>	<b>9</b>	<b>4</b>	<b>7</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>10</b>	<b>17</b>	<b>85</b>	<b>100,0</b>

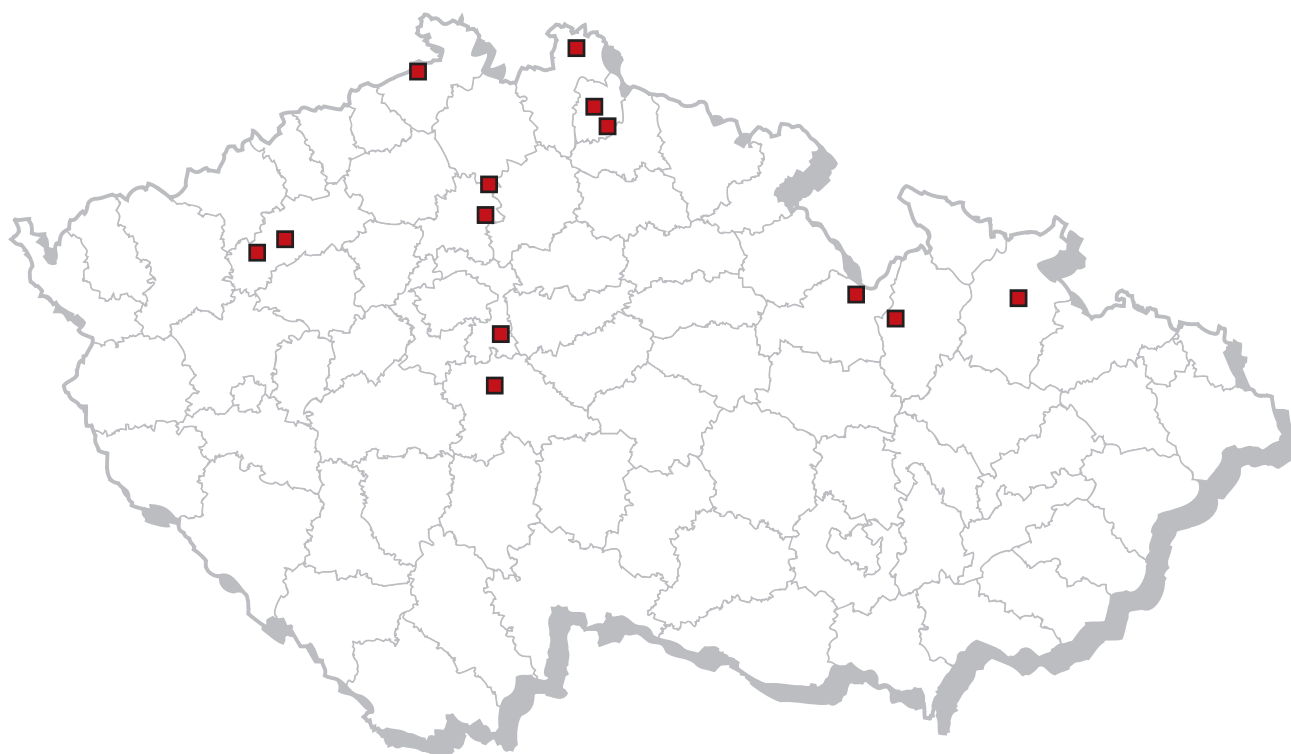




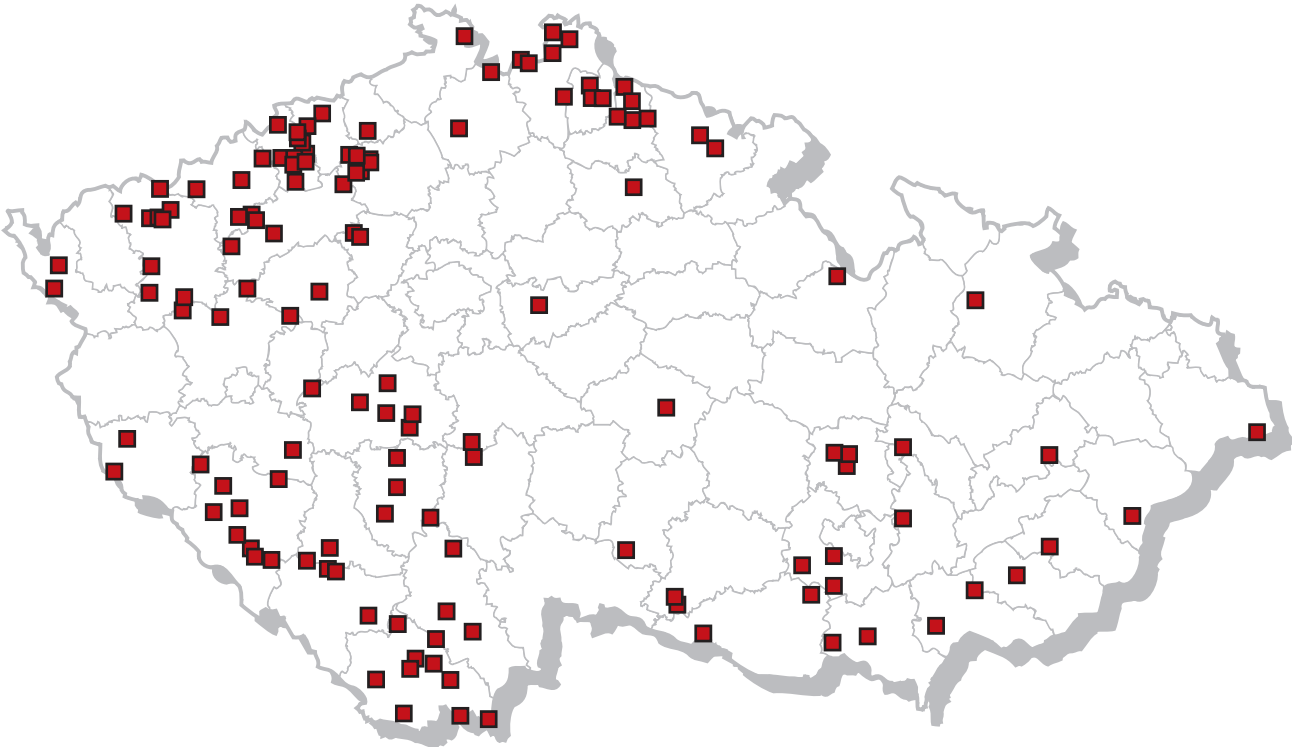
## Distribution of rabies cases in roe-deers in 1984-1988



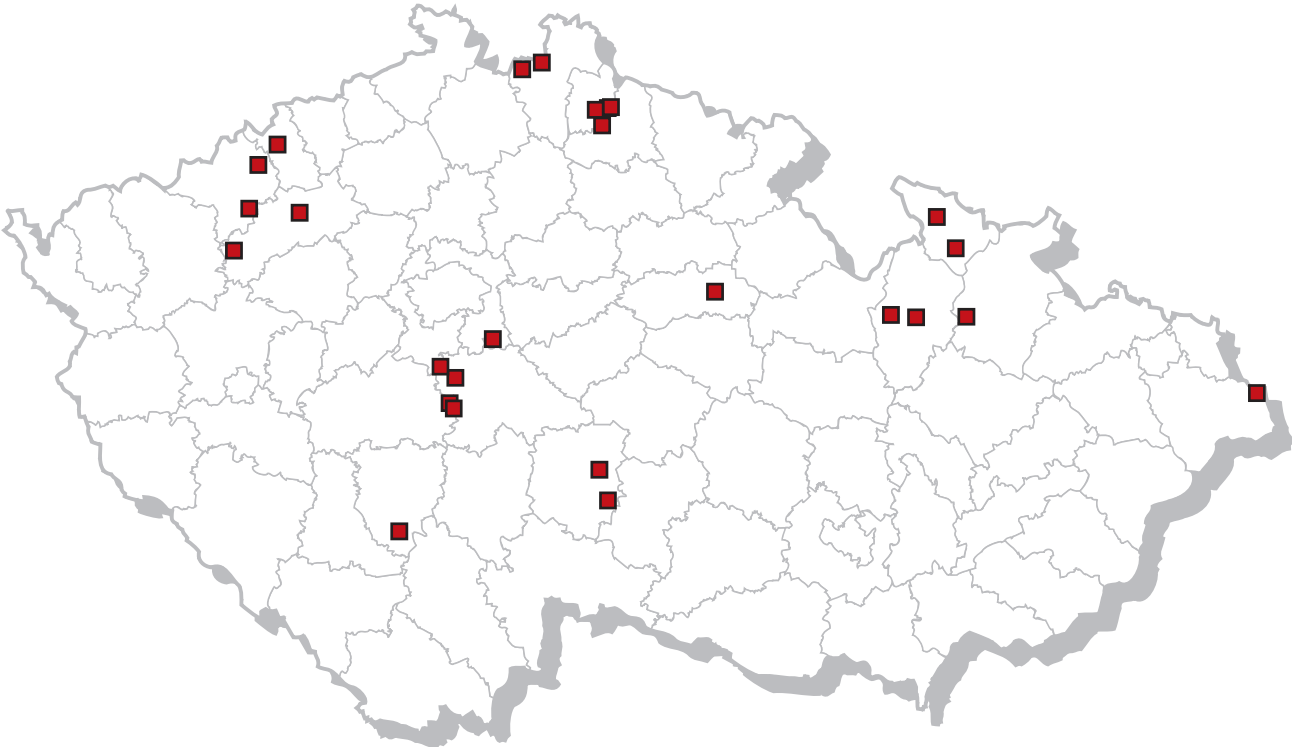
## Distribution of rabies cases in roe-deers in 1994-1998



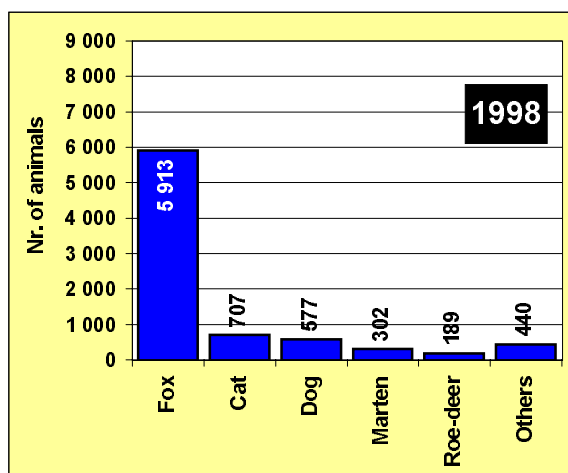
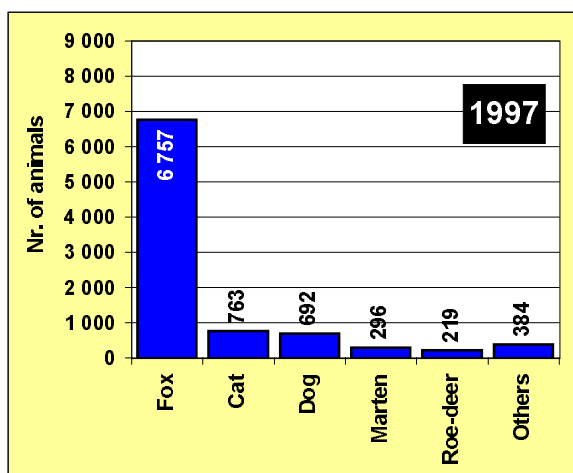
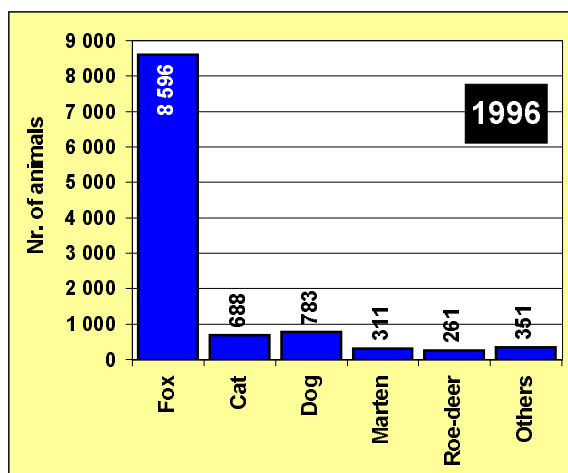
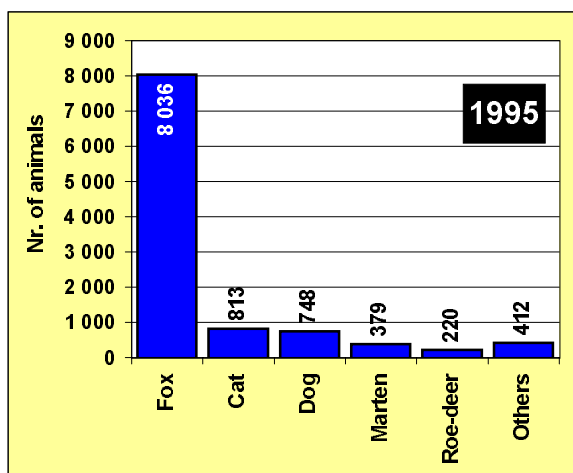
**Distribution of rabies cases in martens in 1984-1988**



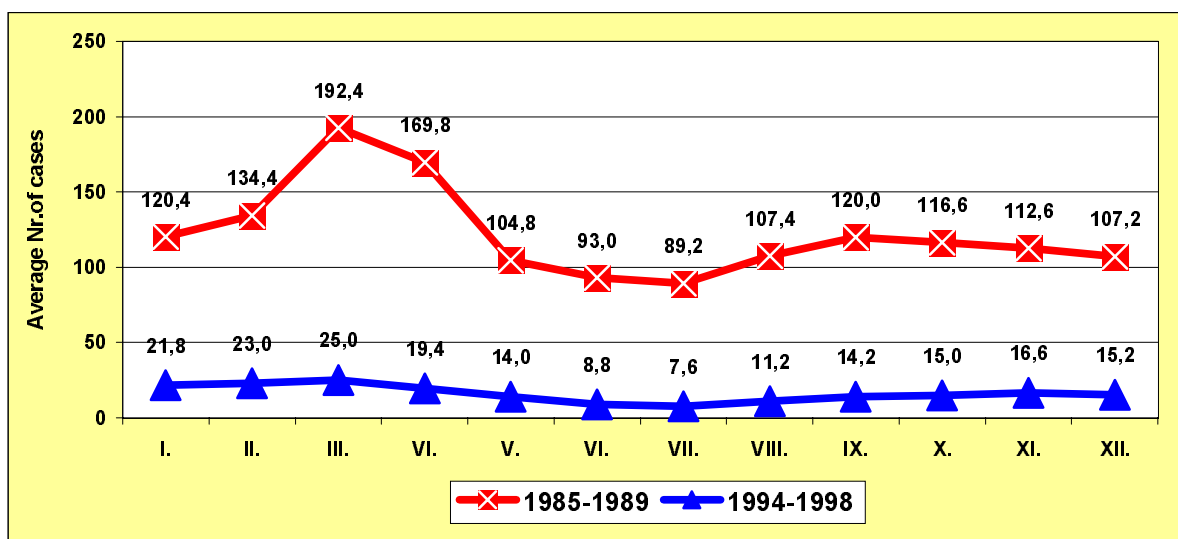
**Distribution of rabies cases in martens in 1994-1998**



## Participation of animal species on rabies examination



## The average number of cases per month



## Rabies cases in the districts of the Czech Republic in 1998

Animal species	Central Bohemia														
	CzR	AB	CeB	BE	BN	KH	KL	KO	MB	ME	NB	PB	PY	PZ	RA
Fox	77	1	9	0	0	0	0	0	0	4	0	4	0	1	0
Roe-deer	2	0	2	0	0	0	0	0	0	2	0	0	0	0	0
Badger	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marten sp.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wild animals	81	1	11	0	0	0	0	0	0	6	0	4	0	1	0
Cat	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dog	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Domestic animals	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>85</b>	<b>1</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>0</b>

Animal species	South Bohemia								
	SoB	CB	CK	JH	PE	PI	PT	ST	TA
Fox	9	0	0	0	6	2	0	0	1
Roe-deer	0	0	0	0	0	0	0	0	0
Badger	0	0	0	0	0	0	0	0	0
Marten sp.	1	0	0	0	1	0	0	0	0
Wild animals	10	0	0	0	7	2	0	0	1
Cat	1	0	0	0	0	0	0	0	1
Dog	0	0	0	0	0	0	0	0	0
Domestic animals	1	0	0	0	0	0	0	0	1
<b>TOTAL</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

Animal species	West Bohemia										
	WeB	CH	DO	KT	KV	PJ	PM	PS	RO	SO	TC
Fox	0	0	0	0	0	0	0	0	0	0	0
Roe-deer	0	0	0	0	0	0	0	0	0	0	0
Badger	0	0	0	0	0	0	0	0	0	0	0
Marten sp.	0	0	0	0	0	0	0	0	0	0	0
Wild animals	0	0	0	0	0	0	0	0	0	0	0
Cat	0	0	0	0	0	0	0	0	0	0	0
Dog	0	0	0	0	0	0	0	0	0	0	0
Domestic animals	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Animal species	North Bohemia										
	NoB	CL	CV	DC	JN	LB	LN	LT	MO	TP	UL
Fox	38	2	0	6	0	0	1	14	0	0	15
Roe-deer	0	0	0	0	0	0	0	0	0	0	0
Badger	1	0	0	0	0	0	0	0	0	0	1
Marten sp.	0	0	0	0	0	0	0	0	0	0	0
Wild animals	39	2	0	6	0	0	1	14	0	0	16
Cat	1	0	0	0	0	0	0	0	0	0	1
Dog	0	0	0	0	0	0	0	0	0	0	0
Domestic animals	1	0	0	0	0	0	0	0	0	0	1
<b>TOTAL</b>	<b>40</b>	<b>2</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>17</b>

## Rabies cases in the districts of the Czech Republic in 1998

		East Bohemia										
Animal species	EaB	CR	HB	HK	JC	NA	PU	RK	SM	SY	TU	UO
Fox	0	0	0	0	0	0	0	0	0	0	0	0
Roe-deer	0	0	0	0	0	0	0	0	0	0	0	0
Badger	0	0	0	0	0	0	0	0	0	0	0	0
Marten sp.	0	0	0	0	0	0	0	0	0	0	0	0
<b>Wild animals</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Cat	0	0	0	0	0	0	0	0	0	0	0	0
Dog	0	0	0	0	0	0	0	0	0	0	0	0
<b>Domestic animals</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

		North Moravia										
Animal species	NoM	BR	FM	JE	KI	NJ	OL	OP	OS	PR	SU	VS
Fox	0	0	0	0	0	0	0	0	0	0	0	0
Roe-deer	0	0	0	0	0	0	0	0	0	0	0	0
Badger	0	0	0	0	0	0	0	0	0	0	0	0
Marten sp.	0	0	0	0	0	0	0	0	0	0	0	0
<b>Wild animals</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Cat	0	0	0	0	0	0	0	0	0	0	0	0
Dog	0	0	0	0	0	0	0	0	0	0	0	0
<b>Domestic animals</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

		South Moravia													
Animal species	SoM	BK	BM	BO	BV	HO	JI	KM	PV	TR	UH	VY	ZL	ZN	ZR
Fox	19	0	0	0	2	5	10	0	0	0	1	0	1	0	0
Roe-deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Badger	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marten sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Wild animals</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
Cat	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Dog	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
<b>Domestic animals</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>