

## Introduction

Tularemia, which is caused by the bacterium *Francisella tularensis*, exist in several different forms; ulceroglandular, oculoglandular, typhoid (septic), pulmonary and oropharyngeal. Sweden experiences recurrent outbreaks with irregular intervals and geographical localizations. Although infections with the type B strains found in Sweden does not normally result in fatalities, they cause significant morbidity unless treated early. Infections are normally treated with ciprofloxacin or doxycycline although aminoglycosides can be used. The infection is classified as notifiable under the Swedish Communicable Diseases Act.

The Norrbotten County is the largest and northernmost county in Sweden and is situated around the arctic circle. It comprises 14 municipalities with a total area of 98 911 km<sup>2</sup>, which is about 25% of the total land area in Sweden. The county has about 250 000 inhabitants which is 2.5% of the total population in Sweden and has a population density close to that of Montana. Almost 60% of the population live in the 3 municipalities Luleå (75966 inhabitants), Piteå (41508 inhabitants) and Boden (27887 inhabitants).

Starting in July 2015, we experienced an unusually large outbreak of tularemia, prompting an epidemiological investigation.

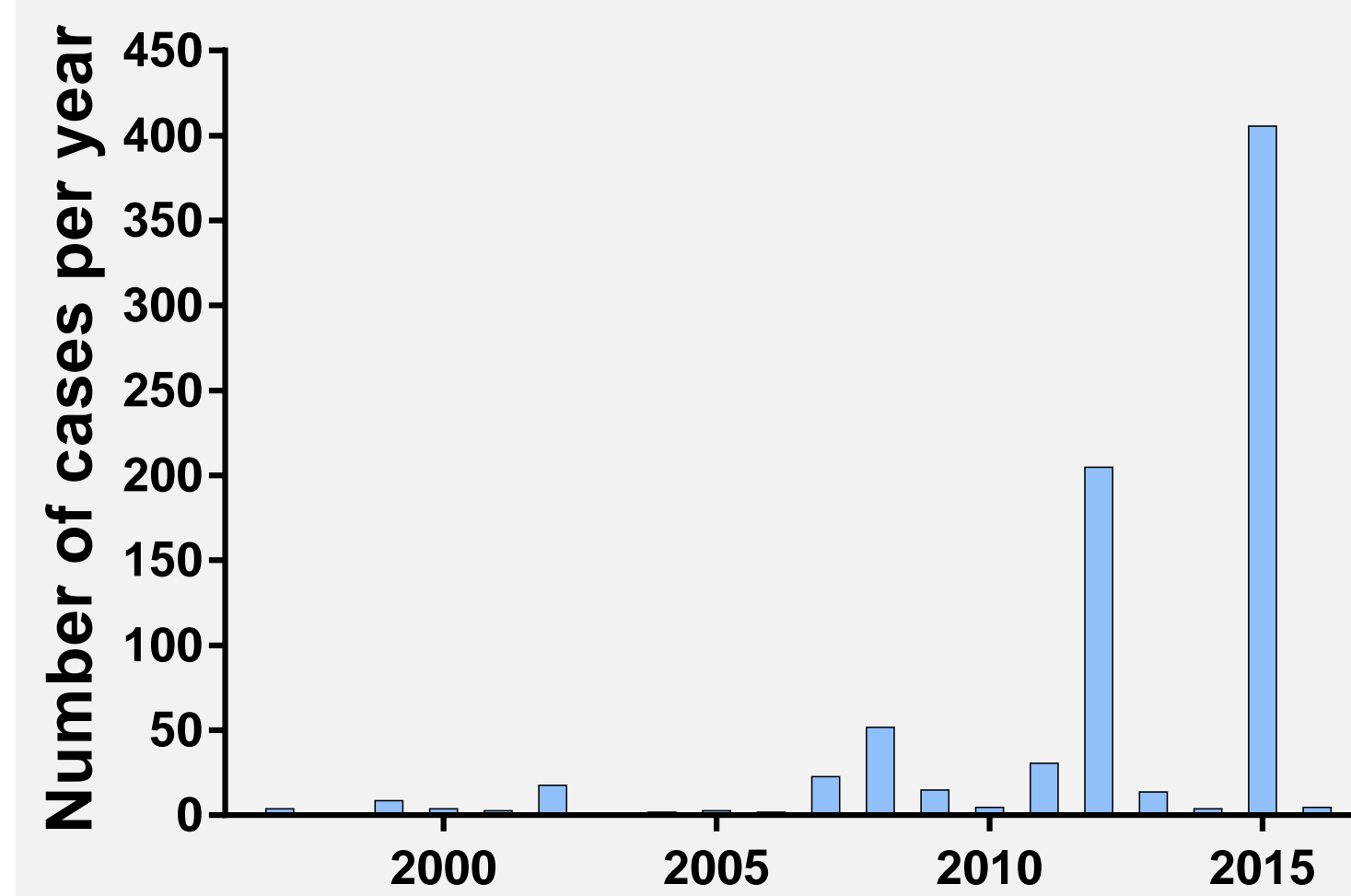


## Methods

Cases were extracted from the County Council of Norrbottens database for notifiable diseases and were analyzed with respect to geographic localization, clinical presentation and a number of other parameters. Population figures and maps were obtained from Statistics Sweden (www.scb.se)

## Results

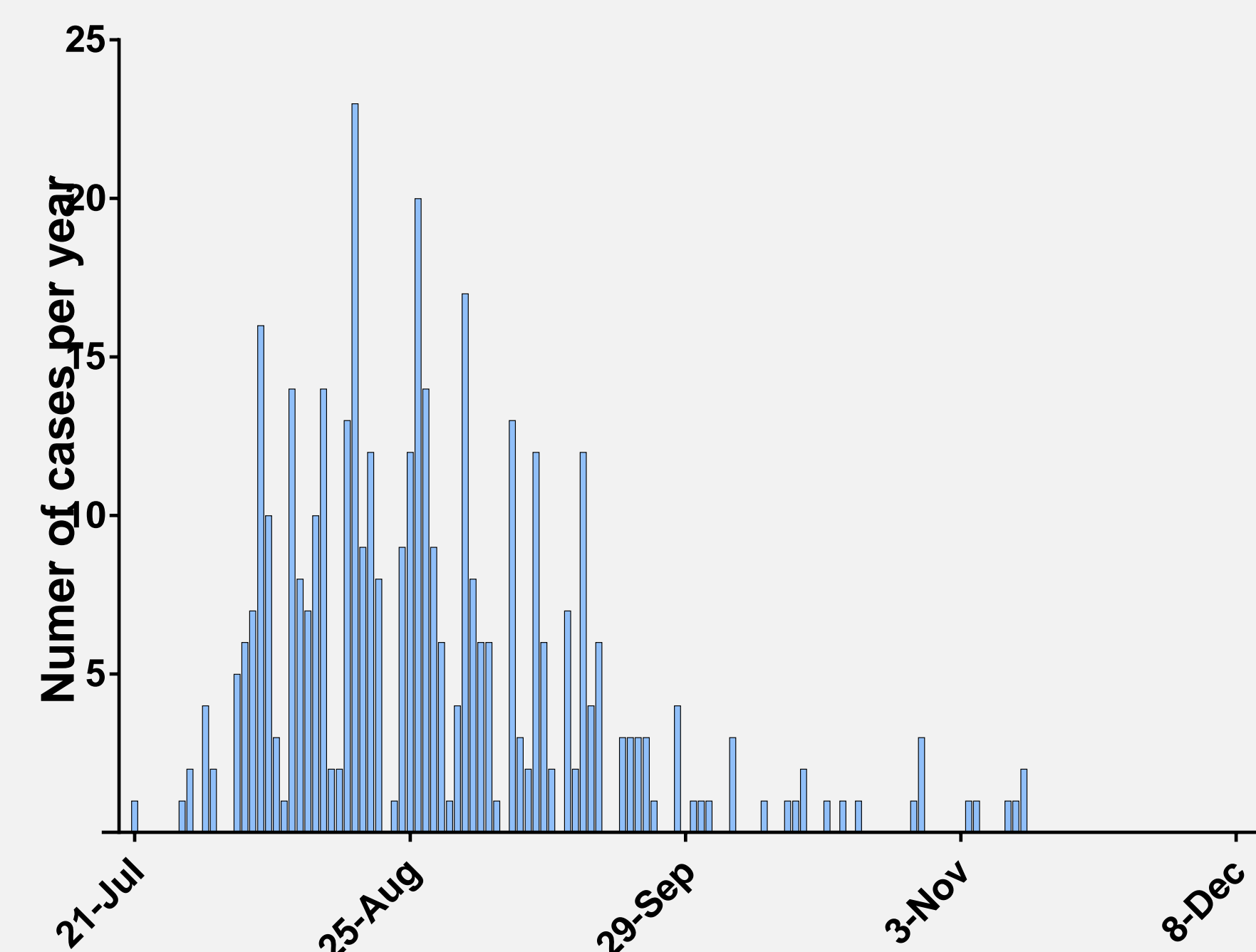
### The largest outbreak in the Norrbotten County.



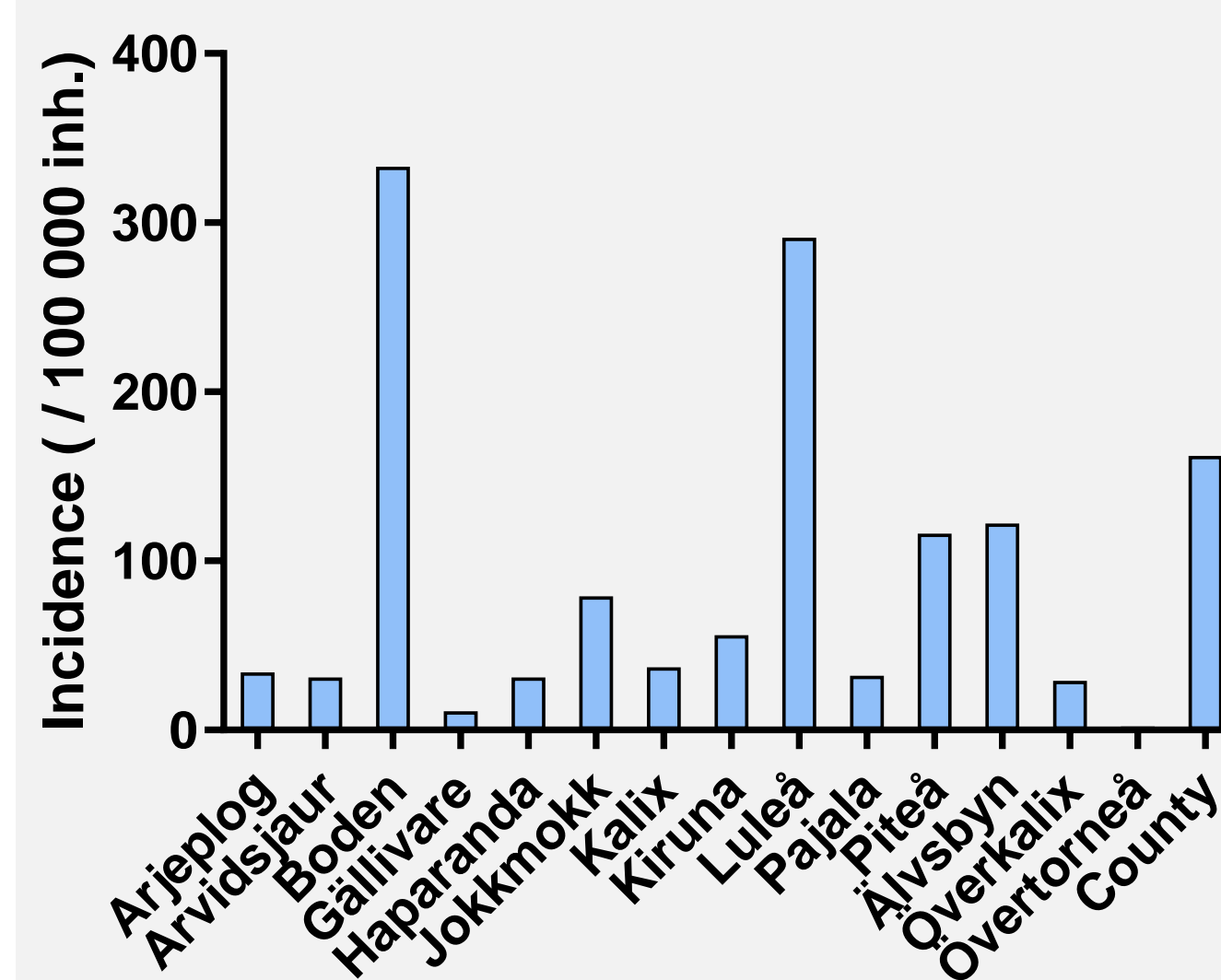
The incidence varies widely between years as illustrated for the last 20 years. The 406 cases of 2015 is a doubling of the previous high in the year of 2012 and puts it amongst the largest outbreaks in Sweden during the period for which statistics is available.

### Timeline – a peak in mid August with a tail well past the end of mosquito season

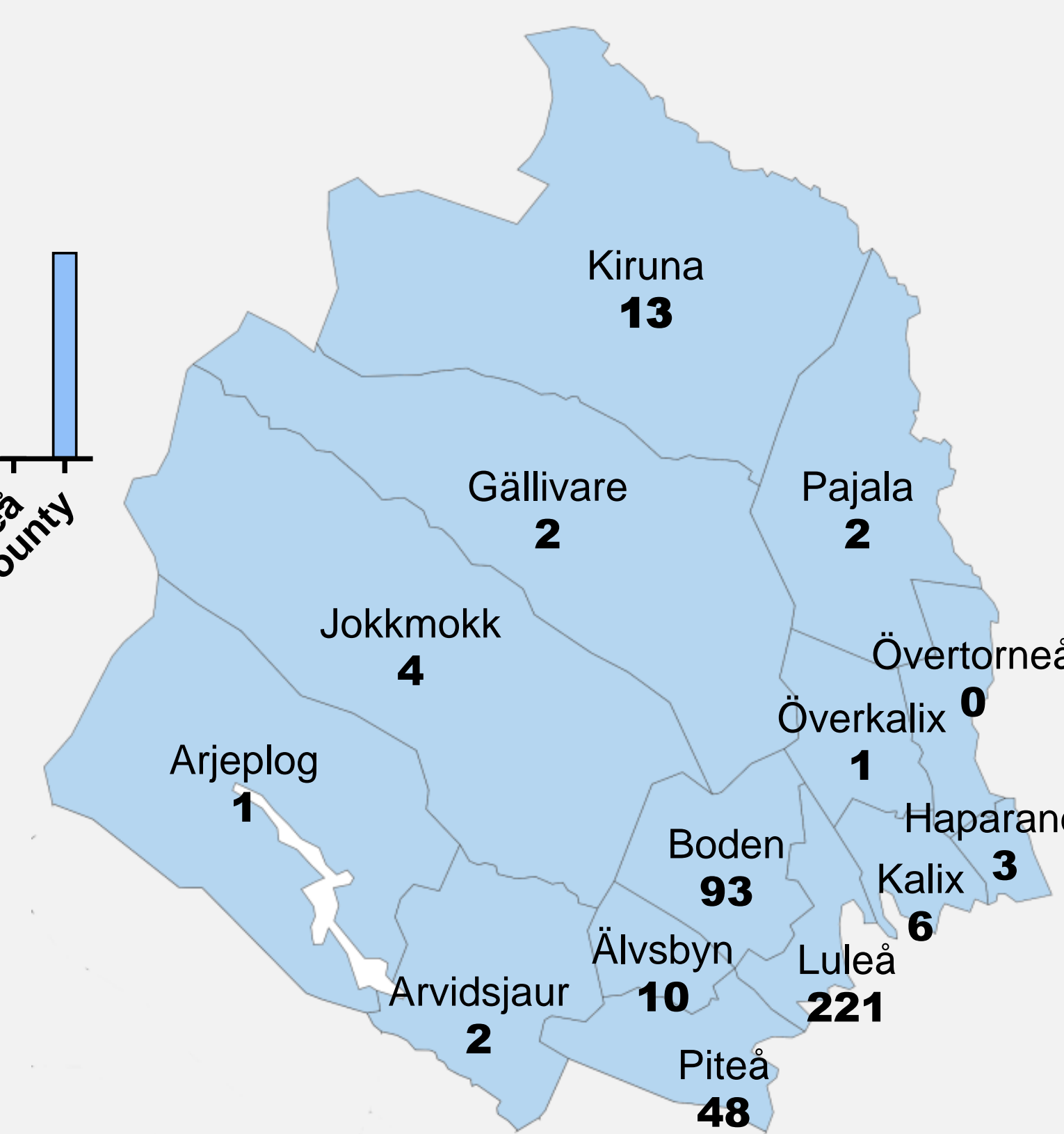
The first case was reported in late July and by the first days of August, it was apparent the outbreak would be substantial. The outbreak peaked in mid August, but sporadic cases were reported during several months afterwards. Mosquito season is largely over by the end of August.



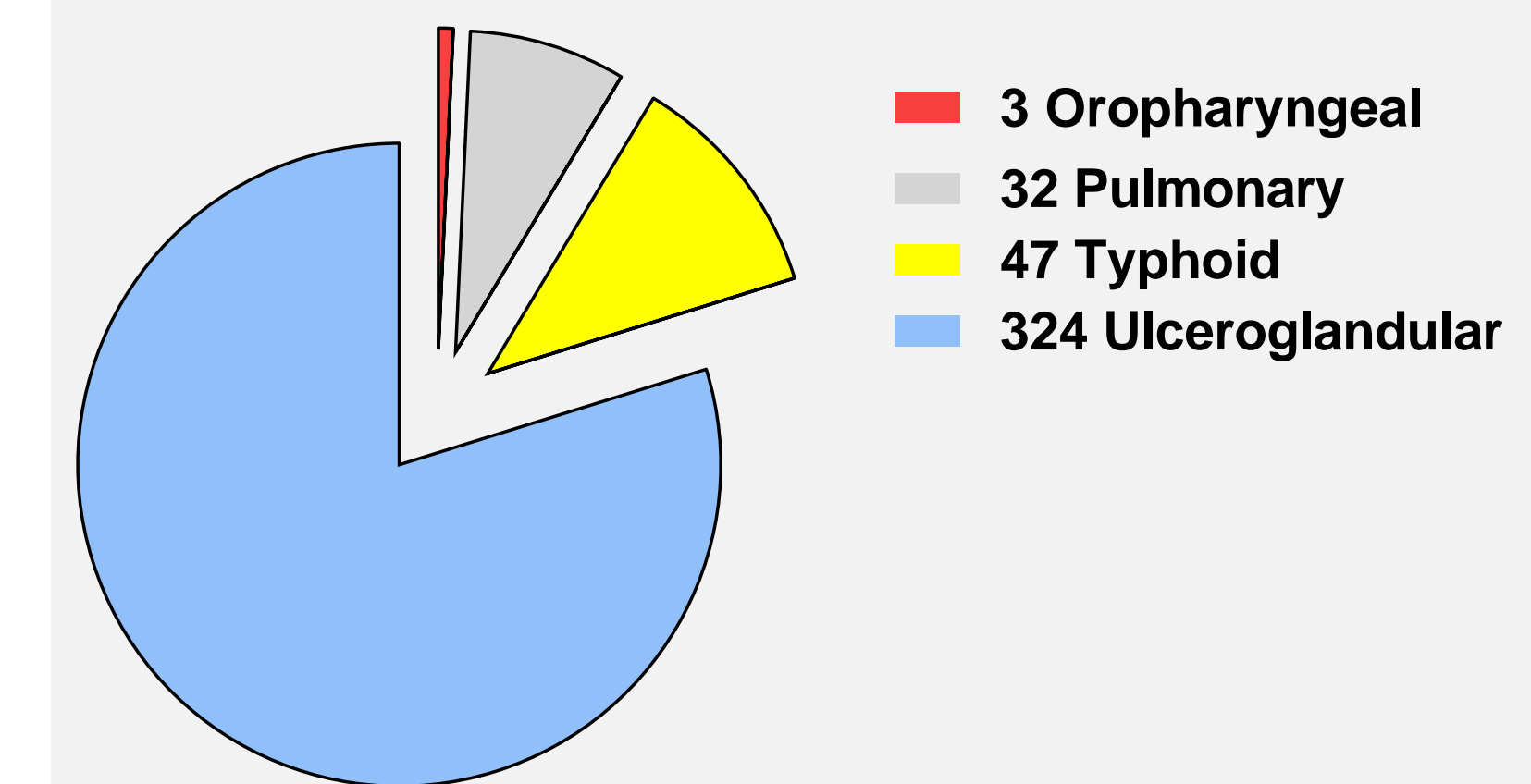
### Geographic distribution – the majority of cases in municipalities close to the coast



Cases were reported from all municipalities except for one. The highest incidence was found in Boden with 330 cases /100 000 inhabitants. Absolute number of cases are given in bold in the figure on the right.



### Distribution of clinical forms – the ulceroglandular form was predominant



As expected, the ulceroglandular form dominated with almost 80% of reported cases. There were no reported oculoglandular cases.

### Age distribution – the typical patient was middle-aged

Cases were grouped according to age in intervals of 10 years. Most cases were diagnosed in people aged 40-69. This probably corresponds to the peak in activities such as fishing, hunting and foraging which results in exposure to mosquitoes.



### Actions taken during the outbreak

- Updated guidelines for diagnosis and treatment.
- Frequent updates of statistics (multiple times per week) during the outbreak.
- Educational efforts (media, e-mails to physicians, hospital homepage etc).

### Conclusions

- The tularemia outbreak of 2015 was the largest in Norrbotten so far and one of the largest ever in Sweden.
- Outbreaks seems to become more common and result in more cases in Norrbotten.
- The 2015 outbreak showed expected patterns of age-distribution and clinical manifestations.

### Contact information

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