

# UNDERSTAND PEST SCIENCE

COMPLIMENTARY ISSUE

HIMSWORTH *ET AL.*, 2014

Urban rat populations

## Background

Norway rats are **ubiquitous** (found everywhere) within both rural and urban environments and live **commensally** with human beings. Rats are **vectors** for **zoonoses** including *Leptospira*, *Rickettsia* and *Streptobacillus* and others. These diseases may increase in future due to urban expansion. The ecology, population structure, behavior and distribution of rats will determine the spread of rodent-borne disease and may be influenced by season.

## This paper investigates

- The density, distribution and variation of an urban rat population
- The size of urban rats and presence of wounds
- Success of trapping methods

“FACTORS ASSOCIATED WITH TRAPPING CAN DETERMINE THE SIZE AND COMPOSITION OF SAMPLED RAT POPULATION”

## What the researchers did

This study was conducted in Vancouver, Canada over 42 ha (43 city blocks) over one year. The area included a port and a low-income housing area. Each block was equipped for a three-week period with 20 Tomahawk live-catch traps along the alleys between buildings. The port was equipped with 56 traps at 8 locations, both indoors and outdoors where staff had observed rats. Traps were pre-baited for 1 week and operated for 2 weeks.

## What the researchers measured

- Location
- Sex, maturity & pregnancy
- Weather
- Body mass, fat & condition
- Presence of bite wounds
- Trap damage/interference

## What the researchers found

- During the study 725 rats were collected; 94.5% were Norway Rats. The remainder were Black Rats predominantly trapped in the port area. Distinct clusters of rat populations were observed.
- 63.9% of Norway Rats were sexually mature. Amongst females, 62.6% were parous (having produced offspring), 20.6% were visibly pregnant, 50.3% were lactating. The average number of embryos in pregnant rats was 9.
- There was no relationship between season and rat abundance.
- The greatest number of pregnant/lactating rats were observed in autumn BUT rats at all life stages were found throughout the year.
- 24.6% of rats had bite wounds; predominantly larger, mature, male rats.

- Out of 878 traps 69.7% were successful. There was no relationship between rainfall or temperature and trap success.
- Trap success was greatest on the first active day (22.2%) (not counting pre-baiting) and declined to <1% success by day 10. The characteristics of trapped rats changed over the period, with mature and larger rats more likely to be trapped earlier in the regime.

### Lessons for the pest controller

1. Urban Norway rats will be found in clusters which depends upon resource availability – food, water, shelter.
2. Urban rats breed and proliferate throughout the entire year, but populations may most mature (and therefore liable to increase and to infringe upon human activities) in autumn.
3. Short (3-4 day) active trapping regimes may be effective in urban environments BUT may not capture a) all rats, or b) an equal number of rats at all life stages. Since more mature, heavier rats were captured first it is unlikely that smaller, lower-ranking rats will be caught until the more dominant individuals have been removed. Longer trapping regimes may be necessary in such instances.

### Things to consider

This study sheds light on the structure of urban Norway rat populations. The pest controller should keep in mind that the live-trapping approach was selected with this objective, not to eradicate the population. Some difference in results may be expected when toxic baits are used. However, the design of trapping regimes in similar environments may benefit from these lessons; particularly regarding the removal of mature or dominant rats before lower-status rats can be successfully captured.

Other papers related to this study are available and address the prevalence of **zoonoses** in urban rats and resulting risks to humans.

“WE SUGGEST THAT CITIES AROUND THE WORLD SHOULD INVEST IN SURVEILLANCE AND RESEARCH THAT AIMS TO UNDERSTAND AND MONITOR LOCAL RAT POPULATIONS NOW AND INTO THE FUTURE”

#### Questions about this article?

Email [vapsagri@gmail.com](mailto:vapsagri@gmail.com) and we will help you to understand the research and apply it on the ground.

#### This Issues Article:

- Himsworth, C.G., Jardine, C.M., Parsons, K.L., Feng, A.Y.T. and Patrick, D.M. 2014. The Characteristics of Wild Rat (*Rattus* spp.) Populations from an Inner-City Neighborhood with a Focus on Factors Critical to the Understanding of Rat-Associated Zoonoses. *PLOS One*. 9(3)  
Download the article at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0091654>