

# Exclusion: the Future of Pest Management



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## Rodents Carry Disease

**BACTERIAL INFECTION CAUSED BY RAT URINE IN BRONX KILLS 1, SICKENS 2 OTHERS**

King County has first two cases of hantavirus in 14 years; one death reported

by KOMO Staff  
Tuesday, March 21st 2017




February 15      March 21




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## Rodents Carry Disease

**Salmonella viable in rodent droppings for 86 days**

**Handling dead rodents can lead to infection**

- Bubonic Plague
- Murine Typhus
- Lyme Disease
- Rat-Bite Fever
- Hantavirus
- Food-Borne Illness
- Febrile Illness




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## PPE for Infestations, Dirt Crawl

hard hat  
hair net  
respirator  
head lamp  
Tyvek suit  
gloves  
boots



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## Pest Management

PMPs protect human health by eliminating existing populations and by preventing new problems

**Identify**  
**Understand**  
**Eliminate & Prevent**



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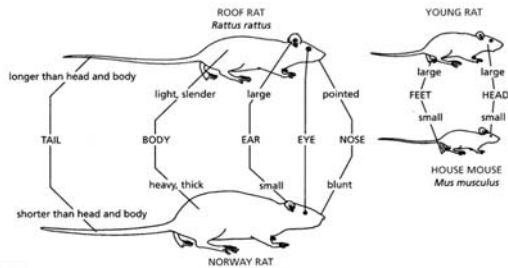
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## The Value of Identification

insight about: *nest sites, seasonal activity, reproductive capacity, foraging behavior, etc.*



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Accurate identification is the foundation of *effective* pest management




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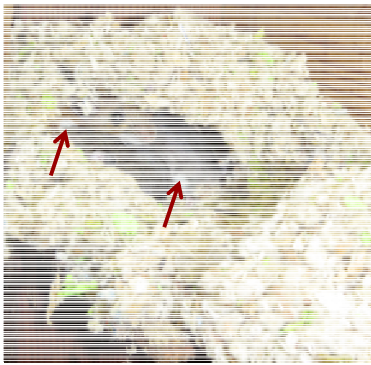
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who is this?




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Identification



**House Mouse**  
monotone fur



**White-footed Mouse**  
white underside  
large eyes/ears




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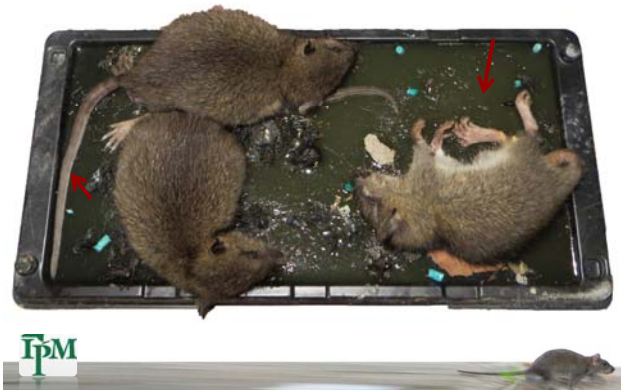
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### Identification




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### Identification



**Norway Rat**

thick tail shorter than stocky body  
smaller eyes and ears than roof rat




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### Target Pest Influences Plan

Which mouse is a permanent resident?

Which mouse is seasonal?

Which mouse is found in urban areas?




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### Target Pest Influences Plan

Your target pest is house mouse,  
what is your exclusion priority?

Your target pest is white-footed mouse,  
what is your exclusion priority?



### Rodent Management

**Record observations over time:**  
who & what did you catch? [M, F, juv, adult]  
is the population actively reproducing?  
are you getting the **breeders**?



Horizontal lines for writing, organized into sections corresponding to the questions above.

### "Sexing" Rodents



Distance from anus to genitals

Presence of a vaginal orifice in females



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### "Sexing" Rodents



Presence of testes in male (if descended)



[www.wikihov.com/Tell-if-a-Mouse-Is-Male-or-Female](http://www.wikihov.com/Tell-if-a-Mouse-Is-Male-or-Female)

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### "Sexing" Rodents



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## Prolific Pests = Rapid Replacement

	House Mouse	Norway Rat
Number of litters	6-8	2-7 (4)
Pups per litter	2-16 [5]	6-14
Total production per female	42-60	36-39
Female sexual maturity (days)	<b>35-60</b>	<b>75-90</b>
Age at weaning (days)	21-28	28

Prolific reproducers: replacement occurs quickly

Mice sexually mature 1+ month, continuous reproduction

Rats sexually mature 2.5+ months, spring & fall repro



Adapted from Corrigan 2011, Mallis Handbook




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## Details may Change Action Plan



adult male:  
how accessing home?  
*Exclusion Emphasis*



pup: nearby indoor nest  
*Inspection Emphasis*




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## Advancing Rodent Management

detailed inspections, systematic monitoring  
and interpretation of evidence are key to  
effective rodent management




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## Inspection

A thorough inspection is key to your success

- Defines the scope of pest problems
- Understand structural deficiencies
- Identify sanitation or water problems
- Accurately quote a price for work
- ***Determines what products to use and where***
- Establishes treatment method



Situational Pest Management - Stoy Hedges  
[PCT Magazine, NOV 2015]




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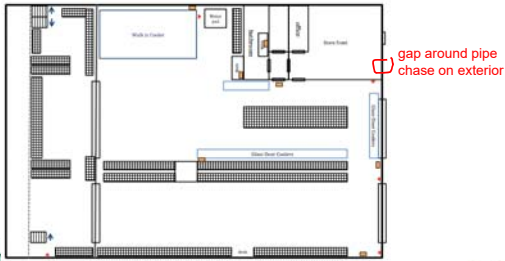
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## Documentation

Part of your inspection is documenting exclusion deficiencies on a facility map




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**80% of pests from 20% of the area**



Neglected areas that are out of sight or hard to clean

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## Inspection vs Monitoring

### inspection

moment in time



### monitoring

record of time



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## Monitoring Outcomes

determine the source of a problem

predict future issues



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## Where to Start

**A thorough inspection is essential to determine the exclusion needs of a facility/location**

Today's Goal: create the awareness

Today's Outcome: provide basis to develop in-house exclusion program



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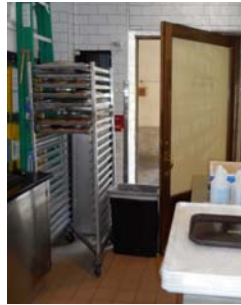
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### Reasons for Pest Entry

attractive odors and air currents



nest sites, food, mates,  
protection from predators  
or weather



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### Keen Observer Training

observe and interpret pest evidence  
gnawing damage, droppings, tracks, odor



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### Terminology Training



See: Of Rodents and Doors  
PCT Magazine August 2015



See: Escutcheonology  
PCT Magazine February 2008

Future: SCOPE Dictionary of Pest Exclusion



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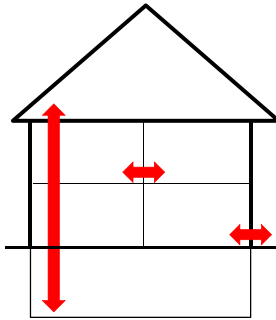
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### Exclusion at the Building Level

exterior to interior  
between rooms  
between floors



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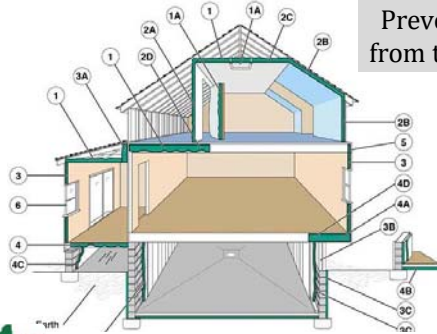
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### some spaces are not accessible

Prevent access  
from these areas



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### Identify Entry Points

based on the dimensions of rodent skulls

Norway Rat



gaps > 1/2"      openings > 3/4"



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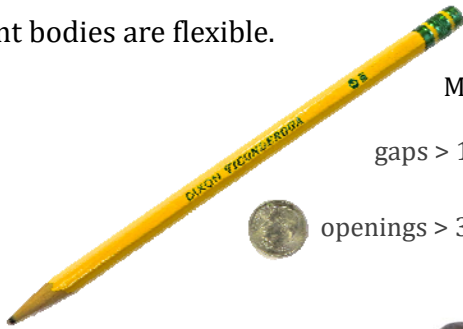
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### Entry Points

rodent *bones* are not flexible...  
rodent bodies are flexible.



Mice

gaps > 1/4"

openings > 3/8"



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### Entry Points



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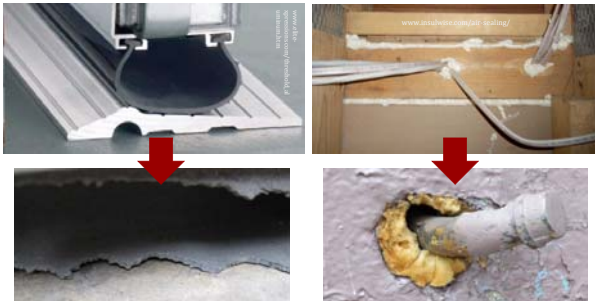
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### Think Permanence

Weatherization is *not* rodent exclusion



Rodents overcome weatherization materials:  
chew, push, climb & work together

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## Product Selection

### Considerations

- Opening size: greater or less than 1 inch
- Opening type: utility; construction; door..
- Pest pressure: actual and/or perceived
- Environment: high/low use; moisture; salt
- Scope of service: pest threshold; pricing
- Aesthetics of work




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## Product Selection



Um... No.




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## Pest Pressure

Pest pressure and environment influence product longevity



Academic Building



Compactor Room




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## Product Selection

Small Opening (<1 inch): sealed by any tech?

- elastomeric sealants
- metal mesh fibers

Large Opening (>1 inch): exclusion crew

- hardware cloth: 0.25 to 0.50 inch mesh
- sheet metal [no edges for chewing]

Door sweeps/astragal seals: exclusion crew




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## New Construction Considerations

### Content

- foundation
- exterior
- lighting
- roofing
- landscaping
- interior walls
- flooring
- doors
- windows
- materials




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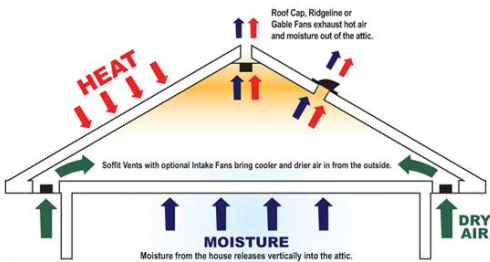
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## Remember Permeability

Sealing soffit vents reduces/eliminates air flow and can lead to moisture problems




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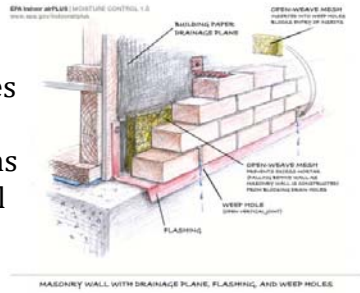
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## Remember Permeability

Sealing weep holes can lead to moisture problems at foundation wall




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## Eliminate Bridges




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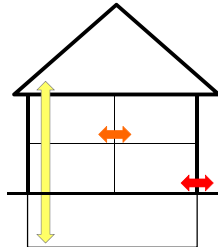
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## Timing of Exclusion

1. trap to reduce the population
2. seal non-preferred entry points
3. seal primary entry point

*Inspect buildings every year to identify new entry points; verify integrity of selected materials*




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### Identify Vulnerable Areas

Recognize sources of food, water, shelter, warmth and areas of activity (pest evidence)



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### Population Reduction

place equipment in areas of rodent activity  
devices >10' from activity may be missed



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### Remove Primary Food Sources

rodents are more likely to interact with traps and bait stations if stressed for food



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### Mouse Trapping Tips



Do mice *always* stay along wall?

Place traps in **runways** or corners

Expanded paddles/triggers in most cases



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### Mouse Trapping Tips

Traps side by side (>1" apart) to catch jumpers

Recommended number of traps per mouse?



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### Cleanouts

Trap catch decrease dramatically after 1 night  
 Remove traps, return in one week  
 Place traps in new locations




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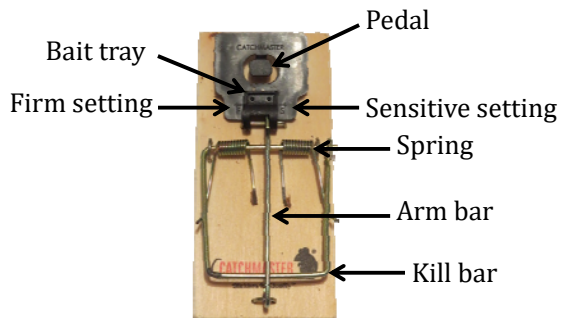
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### Anatomy of a Snap Trap




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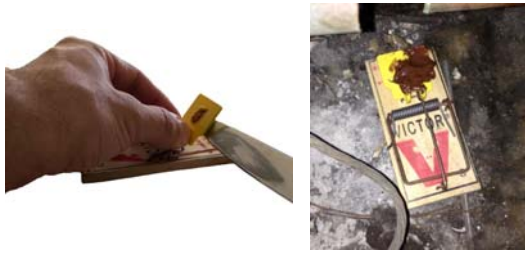
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### Mouse Trapping Tips



Bait trap from back if possible

Do not over-bait traps!



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### Clean Contaminated Surfaces

Remove droppings for pathway analysis

- Ventilate
- Wear gloves
- 10% bleach or a disinfectant
- Allow 5 minutes
- Remove [paper towel, HEPA vac]
- Dispose



[www.cdc.gov/rodents/cleaning](http://www.cdc.gov/rodents/cleaning)



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### Rat Trapping Tips

*Pre-bait to overcome neophobia*



Trap baited, but not set

Trap set after 3+ days  
(rat is visiting trap)



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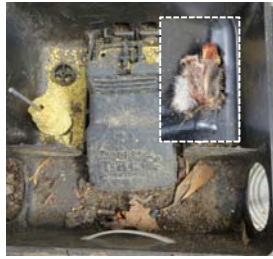
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## Trapping Rats



Will subsequent rats avoid this trap?



Will *this* rat avoid subsequent trap?



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## Opportunities in Exclusion

pest exclusion can be routine service

- routine inspections
- identify new entry points
- repair/replace materials
- indoor monitors for verification



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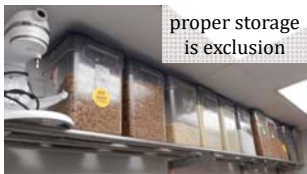
## Opportunities in Exclusion



missing tile grout:  
fly breeding site



no sealant  
around grease trap



proper storage  
is exclusion

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### Establishing New Goals

services that *manage* populations or services that *prevent* rodent problems?



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### Changing our Concept of Success

Not about how many you kill, but how many have you left behind..



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### Short-Term or Long-Term?

Consider **long-term solutions** in place of **short-term**, temporary control [checknician concept]



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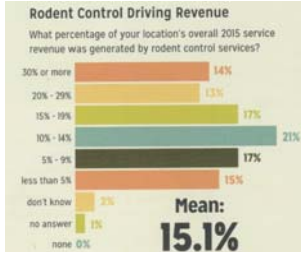
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## Know Your Value

Callbacks are expensive, but part of the service  
Plan for callbacks and price accordingly




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 The New York State IPM Program

 @NYSIPM

 NYSIPM

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@MateoFrye  
mjf267@cornell.edu

Cornell Cooperative Extension provides equal program and employment opportunity

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