



# *Rodent Inspection and Monitoring*





# Rodent Inspection and Monitoring

- // Overview
- // IPM in Rodent Management
- // The Goal of an Inspection
- // Nesting Areas, Food and Water Sources, Entry Points
- // Signs of Presence of Rodents
- // Rodent Inspection Tools
- // Conducting Inspections
- // Evaluating the Extent and the Size of the Population
- // Implementing a Monitoring Sequence
- // Summary





Rodent Inspection and Monitoring

# *Introduction*





# Overview

Rodents give many signs they are infesting an area. The Inspection and Monitoring will determine:

- If a site is infested
- By which species it is infested
- Where they are feeding and nesting
- What is their pattern of movement
- What is the size and the extend of the population

This will help the PCO:

- To decide what management measures to use
- To decide where and how to use them
- To assess the efficacy of the management program in place over time



# Overview

In your opinion, in order to match the goals of the inspection, what is the less useful sign of presence during a daylight inspection :

- Droppings
- Tracks
- Urine stains
- Sounds
- Visual sightings
- Nest and burrows
- Odors
- Gnawing marks





Rodent Inspection and Monitoring

# *IPM in Rodent Management*





# IPM in Rodent Management

A well conducted Inspection and Monitoring is part of an IPM (Integrated Pest Management) approach.

The key steps in IPM are:

- ✓ **Implementing long term prevention** more than short term control
- ✓ **Implementing a correct pest identification and monitoring**
- ✓ **Combining several complementary management approaches** for an optimized effectiveness
- ✓ **Using pesticides while minimizing their potential impact** on environment, humans and non-target species

In this course we will focus on the **ways and tools to conduct a correct pest identification and monitoring.**





# The Three (3) Major Rodent Pests

These 3 rodent species are known for living close to human beings and to cause most of the damages to households, buildings and stored food.



Norway rat  
(*Rattus norvegicus*)



House mouse  
(*Mus musculus*)



Roof rat  
(*Rattus rattus*)

Why do we call them **Commensal Rodents** ?

- Because they are linked to human activities
- Because they feed on human food
- Because they are sometimes considered like pets







Rodent Inspection and Monitoring

# *The Goal of an Inspection*

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# What is the Goal of an Inspection ?

Remember that you are trying to find 5 main things related to Rodent presence:

- Nesting areas, shelter and harborage
- Food sources
- Water sources
- Access points
- Signs of Rodent activity



Rodent Inspection and Monitoring

*Nesting Areas, Food and  
Water Sources, Entry Points*





# Where to look for nesting areas and harborages ?

Rats and Mice have different habits, e.g. rats more commonly to nest outdoor while mice to nest inside human buildings. In general it is necessary to inspect both outdoor environment and indoor premises to identify potential favorable rodent harborage and nesting locations :

## **Outdoor:**

- Accumulated garden debris
- Uncut vegetation, green fences and bushes
- Piled wooden boards or pallets, tires
- Manholes, conduit shafts, drains
- Buildings foundations and slabs
- Along fences
- Compost bin

## **Indoor:**

- Double walls and plasterboards, false ceilings, insulation
- Stored food areas, rooms and furniture
- Attics, basements, garages, storage and garden sheds
- Large electrical appliances and technical or heating rooms

## **Useful Tools** (more details in the Tool Box chapter):

Flashlight, telescoping mirror, ladder, Visual IR thermometer





# Differences in Nesting and Harborage Among Commensal Rodents

What are the common nesting locations for each species ?

Drag the answers below the corresponding rodent species (multiple answer possible)

## Brown Rat

Burrows  
Basements  
Walls  
Floor voids  
Wood piles

## Roof Rat

Walls  
Attics  
Trees  
Storm drains  
Wood piles

## House Mouse

Stored material  
Walls  
Appliances  
False ceilings  
Wood piles  
Floor voids  
Attics





# Food and Water sources

Rodents need food and water to survive. Baiting programs often fail because the bait can't compete with the rodents regular food available in its environment. Reducing or eliminating the rodents normal food encourages them to feed on any rodenticide placed in their territory, which is an essential component of success for the rodent population management.

**Food sources** for rodents in and outside buildings are numerous. The main ones that you have to identify during an inspection are :

- Garbage and trash bins
- Bird seeds and bird feeders
- Pet food and pet feces
- Spilled food in general
- Fallen fruits uncollected on the ground
- Compost bin
- Stored food in garages and storage sheds
- Uncleansed cooking areas, grills and BBQ
- Snails and weed seeds



**Tip :** If all these sources cannot be merely eliminated, it is necessary to limit their access to rodents or to move them away from the housing (e.g. bird feeders, compost bin)

**Water sources** for rodents is mainly in the food they found but also in the free water present in the vicinity of housing and human activities. It is necessary to reduce the access to water by inspecting and repairing when necessary :

- Leaking of faucets, sprinklers, piping, irrigation systems
- Condensation water from air conditioning
- Uncovered drains
- Unnecessary standing water

**Useful Tools** (more details in the Tool Box chapter):  
Flashlight, telescoping mirror, ladder



# Differences in Food and Water sources among Commensal Rodents

What is quite specific to some rodent species and might be a clue for the identification of their presence ?

Associate the following food and water sources to the relevant species (multiple links possible)

Free water

Eggs

Snails and insects

Weed seeds

Brown Rat

Roof Rat

House Mice





# Rodent access and entry points

Rodents only need very tiny holes and cracks to access a new environment and they can gnaw through wood, lead, aluminium, copper, cinder block and uncured concrete to enlarge these openings.

It is therefore important to identify all these potential entry points in order to minimize them.



**Tip :** In case you need to confirm that an entry point is the one leading to the infestation, temporarily close suspected holes and entryways with dirt, paper or aluminum foil. After few days, return to see if the material was removed or chewed through, which will confirm this is an access point.

What are the appropriate names for the practice of making rodent entry points minimized (multiple answers possible) :

- Rodent kick out
- Rodent exclusion
- Rodent expulsion
- Rodent proofing







# Rodent access points : what should be inspected, looking for gaps

## Outdoor :

- On the roof among the rafters, gables and eaves; openings in roof tiles
- At junction between roof and tree limbs
- At junction between roof and chimney
- Around windows and doors
- At open vents or screen vents close to ground or at heights on the façade
- At openings where A.C. line or appliance enter wall
- Under or on side of garage door
- Around foundations and crawl space
- Around holes for electrical, plumbing, cables and gas lines
- open building sewers which connect to the main sanitary sewer

## Indoor :

- Inside, under and behind kitchen cabinets, refrigerators and stoves
- Inside closets near the floor's corners
- Around doors and windows
- Around the fireplace
- Around plumbing pipe under sinks and washing machines
- Around the piping for hot water heaters and furnaces
- Around floor vents and dryer vents
- Inside the attic
- In the basement or crawl space
- At floor/wall juncture

**Useful Tools** (more details in the Tool Box chapter):  
Flashlight, telescoping mirror, ladder, paper or Al foil



# Rodent Proofing: what should be done when gaps are found

- ✓ Close all openings larger than 0,6 to 0,7 cm to exclude rats and mice
- ✓ Smaller gaps can be filled cheaply and easily with steel wool or copper mesh and caulk\* may be used to seal it in place
- ✓ Repair or replace damaged vent screens
- ✓ Screen vents, holes and overlapping roof using a hardware cloth at 6-7 mm mesh
- ✓ Use sheet metal collars around pipe entrance on wooden walls
- ✓ Use cement fill around pipe in brick, stone or stucco walls
- ✓ Subfloor crawlspace entry hole must be sealed with a door or a lid that will exclude finger size objects
- ✓ Use sheet metal edging along door bottoms to prevent entry and gnawing by rats
- ✓ Repair broken or open building sewers to prevent sewer rats infesting the property

\* See the tool box chapter for the most appropriate solutions



Rodent Inspection and Monitoring

# *Signs of Presence of Rodents*





# The main signs of Rodent presence

The natural habits of rodents give to the PCO evidence of their activity. Most usual rodent presence signs are :

- Droppings
- Tracks
- Urine, stains and odors
- Sounds
- Smudge or rub marks
- Visual sightings
- Runs
- Burrows and nests
- Gnawing marks and wood chips



Are you familiar with making distinction between rats and mice signs of presence ?

Among the following sentences, tell which ones are true:

1. Mouse odor is different from rat odor and can be differentiated with practice
2. Finding runways is easier for rats compared to mice
3. Rats are making occasionally “urinating pillars”
4. Mice are more visible than rats at daylight
5. Finding finely shredded paper and other fibrous materials is the indication of a nest for both rats and mice





# Signs of presence – inspection learnings

## 1. Droppings

### Questions

- Which rodent species is it ?
- Any risk of confusion with other species ?
- Where to found the highest number of them ?
- If the rodent population still active ?
- Is it recent or old rat droppings ?

### Answers

- Droppings differ in size and shape between Rodent species (see Rodent Module « Fundamentals of the Rodent Management »)
- Mouse droppings are very similar to those of large cockroaches, bats and other mice like meadow mice (*Microtus spp.*)
- In locations where rodents rest or feed
- Sweep up old droppings, then re-inspect a week later for new droppings
- Fresh droppings are black or nearly black, they may glisten, look wet and have the consistency of putty. After a few days, they become dry hard and appear dull. After a few weeks, they become grey, dusty and crumble easily.



**Tip** : old droppings moistened by rain may look like new droppings but when crushed, they will easily crumble

**Useful Tools** (more details in the Tool Box chapter):  
Flashlight, telescoping mirror, blacklight



# Signs of presence – inspection learnings

## 2. Tracks, including foot prints and tail marks

### Questions

- Where to look at these marks ?
- Which rodent species is it ?
- Any risk of confusion with other species ?

### Answers

- Along walls, on dusty surfaces or on mud
- A rat's foot print is about 2 cm-long and may show 4-5 toes. A mouse's footprint does not exceed 1 cm-long and are usually more numerous. A tail dragline is usually in the middle of the tracks
- Rodent track have a typical design with spread toes and a central pad



**Tip** : do not use flour instead of talc or clay since it may attract insects

**Useful Tools** (more details in the Tool Box chapter):  
Track plates, tracking dust, talc or clay



# Signs of presence – inspection learnings

## 3. Urine, stain and odors

### Questions

- Where to look for urine marks ?
- How to identify easily a urine stain from both rat and mouse ?
- Which rodent species is it ?
- Can we differentiate between brown rats and roof rats ?

### Answers

- Along walls, in bait stations and close to identified shelters, paths and food sources
- It will glow blue-white under a UV light (or blacklight)
- Mouse urine and odor differ from rat's urine and odor in several ways :
- Mice will drop many tiny amounts of urine
- They occasionally make small mounds known as urinating pillars\*, whereas rats don't
- The house mouse has a characteristic musky odor different from the one of rats
- Roof rats has less tendency to drop urine and droppings on the floor hence the abundance of rat urine and droppings on the floor in buildings is the sign of the likely presence of brown rats



**\*Tip** : a urinating pillar is a combination of grease, urine and dirt, dropped by mice and which may become quite conspicuous

**Useful Tools** (more details in the Tool Box chapter):  
Blacklight torch, telescoping mirror



# Signs of presence – Inspection Learning

## 4. Sounds

### Questions

- When is it possible to identify rodent sounds ?
- Which rodent species is it ?
- Any risk of confusion with other species ?

### Answers

- When a building is quiet and preferably when rodents start their activity, in particular at dusk
- Both mice and rats are generating similar sounds as gnawing, climbing in walls, running across the upper surface of ceilings and squeaks. Rats running generates a sound of individual paws whereas mice paw sound is generally indistinct. Fighting noises are more common with rats.
- Birds can also generate noise (scratching and flapping noise) in the ceiling but it occurs generally at dusk or dawn whereas rodent's noise might occur in the middle of the night



**Tip :** ask to the homeowners about any sound in the ceiling heard in the middle of the night since rodent's gnawing and chewing noises are generally quite easily identified by the home habitants

**Useful Tools** (more details in the Tool Box chapter):  
Stethoscope





# Signs of presence – inspection learnings

## 5. Smudge and rubmarks

### Questions

- Where to look for smudge and rubmarks ?
- What is causing these marks ?
- Which rodent species is it ?
- Are these marks recent or old ?

### Answers

- As a result of repeated rubbing, these marks will appear on the highly frequented runs on hard surfaces, namely on beams, rafters, pipes and walls.
- Rodent's fur oil/grease and dirt
- All species are generating greasy smears, however, due to their size, mouse spots are smaller and more difficult to detect compared to the one of rats. Beside marks in height might more likely come from the Roof Rat than the Brown Rat
- New rub marks may smear if you rub them with a gloved finger whereas old marks are darker and may flake off.



**Tip :** Mouse markings will likely cover a smaller area than those made by rats

**Useful Tools** (more details in the Tool Box chapter):  
Flashlight, telescoping mirror



# Signs of presence – inspection learnings

## 6. Visual sightings

### Questions

- What can we see during an inspection ?
- When is it possible to see living rodents ?
- Which rodent species is it ?
- How to interpret finding a rodent carcass ?

### Answers

- Living rodents or dead animals
- All day long but more likely between dusk and dawn since rodents are in general nocturnal.
- A trained technician can easily identify a mouse or a rat at a glance. Beside mice are more often active in daylight.
- Dead animals are the signs of a current or past infestation. Dry carcasses or skeletons may mean an old infestation whereas fresh carcasses are an indication of an ongoing baiting in the area.



•**Tip** : Seeing rats in daylight may indicate a high population

**Useful Tools** (more details in the Tool Box chapter):  
Flashlight, trail/game camera, Visual IR thermometer



# Signs of presence – inspection learnings

## 7. Runs

### Questions

- Where can we see runs during an inspection ?
- Can we see runs indoor ?
- Which rodent species is it ?

### Answers

- Runs are the marks of a repeated passes of one or more individuals, between feeding and harborage areas. They are mostly found outdoor next to walls, along fences, under bushes and buildings.
- Indoor runways are harder to identify and may appear as well polished trails, free of dust
- It is likely rats, since mouse runways are indistinct trails free of dust but not readily detectable



•**Tip** : finding runways will help to effectively place traps and bait stations

**Useful Tools** (more details in the Tool Box chapter):  
Flashlight, telescoping mirror



# Signs of presence – inspection learnings

## 8. Burrows and nests

### Questions

- Where can we find burrows and nests during an inspection outdoor ?

### Answers

- It highly depends on the species :
- Brown rats: burrows are found like runs along walls or fences, next to building or under bushes and debris. Indoor they will prefer nesting inside walls, in the basement and in the space between floor and ceilings. They also nest in sewers.
- Roof rats: they nest above ground in vegetation like ivy and climbing vines, in trees like yucca, palm and cypress trees but also in wood piles. Indoor they will prefer attics, garages, in the roof and in storm drains.
- Mice: mostly indoor in garages, attics, basements, closets and storage places. They also commonly nest in insulation and voids of the walls with fibrous and shredded materials like paper, cloth, burlap, insulation or cotton.



•**Tip** : Mice often nest close to their food, usually at 3 to 10m distance, in an undisturbed location.

**Useful Tools** (more details in the Tool Box chapter):  
Flashlight, telescoping mirror, Visual IR thermometer



# Signs of presence – inspection learnings

## 9. Gnawing marks and wooden chips

### Questions

- Where can we find gnawing marks and wooden chips during an inspection ?
- Which rodent species is it ?
- Are these marks recent or old ?

### Answers

- Gnawing marks are visible on doors, ledges, in corners, in wall material and stored material. Wooden chips with a consistency like those of coarse sawdust will be found around baseboards, doors, basement windows and frames, and kitchen cabinets
- Scratch-like marks approx. 0,15 cm are made by mice while 0,3 cm gnaw marks are made by rats.
- Fresh gnaw marks on wood are light and will turn darker over time



•**Tip** : entry holes made by rodents by gnawing are less than 4 cm diameter for mice and more than 5 cm for rats

**Useful Tools** (more details in the Tool Box chapter):  
Flashlight, telescoping mirror





# Signs of presence – Review questions

## Differences between commensal rodents

True or False ?

- It is possible to mistake cockroach droppings for mouse droppings
- Rats and mice running in the ceiling are similar and indistinguishable
- Roof rats are generating rub marks in height
- Rat markings are covering a larger area compared to those made by mice
- Mouse activity in daylight may indicate a high population
- Runways is likely the sign of presence of a rat population
- Roof rats are often nesting in sewers





Rodent Inspection and Monitoring

# *Rodent Inspection Tools*

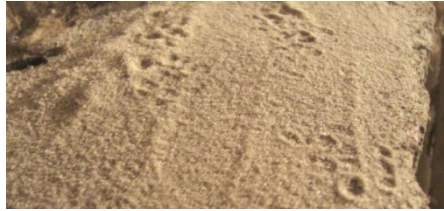




# The tool box for the inspection - Portfolio



Visual IR thermometer



Track plate



Flashlight



Stethoscope



Telescoping mirror



Trail/game camera



Blacklight



# The tool box for the inspection – Review of specific usages

Beside the PPE (Personal Protective Equipment) containing in particular gloves and knee pads, and beside the common site inspection tools including a ladder, a pencil and a notepad, and an inspection checklist, these equipments are useful for conducting an efficient inspection while easing the detection of rodent signs.

Match the tools below with the inspection goals - Note that the **telescoping mirror** and the **flashlight** are kept aside since they are useful in almost of these circumstances:



Inspection goals		paper or Al foil	track plate	game camera	visual IR thermometer	stethoscope	blacklight torch
Nesting areas							
access points							
signs of presence	droppings						
	tracks						
	urine, stains and odors						
	sounds						
	smudge or rub marks						
	visual sightings						
	runs						
	burrows and nests						
	gnawing marks and wood chips						





Rodent Inspection and Monitoring

# *Conducting Inspections*

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# Conducting a Rodent inspection

## 1. Draw a site diagram

### Report on the diagram

- All findings related to the evidence of the infestation (rub marks, paths, droppings, etc), in order to identify the nature and the importance of the infestation
- The access and entry points, in order to seal them and therefore prevent a new infestation
- All areas indicating potential shelters, nesting areas, feeding and water sources, in order to remove or limit the access of the established rodent population to shelter, food and water. Restricting completely the access to one factor either food or water is usually sufficient to lead to the population decline

### Indicate on the diagram

- The actions immediately implemented during the initial visit
- The place of the bait stations and of the other control measures (traps or glue boards) with an adapted order numeration



# Conducting a Rodent inspection

## 2. Fill out an inspection form

○Use a form indicating in lines and columns the list of points to be checked. In particular the form should preferably include :

The type of the premises (residential, commercial, industrial, ...) and its details

2 separate folders for the indoor and the outdoor inspection of the site

The description of the following rodent risk categories :

- Food
- Water
- Harborage
- Entry/access

One cell for indicating the presence of non-target animals including humans, children, domestic animals and wildlife

One line per placement of a bait station or a trap or a glue board

○Report on the inspection form

All findings done during the inspection

All preventative and control measures done during the inspection



Rodent Inspection and Monitoring

# *Evaluating the Extent and the Size of the Population*





# Evaluating the extent and the size of the rodent population:

## 1. Extent

The evaluation of the size and the extent of the colony is of primary importance in order to estimate the actual perimeter of the infestation and in order to dimension the adequate control measures

### **Extent:**

it may be that the infestation extends beyond the boundaries of the site, so preferably the owners and occupiers of neighboring premises should be consulted about undertaking control measures at the same time as the infested site is treated.

presence of burrows and holes, runs and grease marks, fresh droppings, signs of damage and footprints in dust or muddy areas are reliable source of information about the extent of the infestation



**Tip:** although mouse colonies may be of a limited extent there may be a number of colonies in different nearby buildings which comprise an infestation.

**Tip:** rats can move long distances from areas of shelter to sites which provide them with the resources they require such as food. It is not uncommon for them to travel 500 metres but greater distances are possible.



# Evaluating the extent and the size of the rodent population

## 2. Size

### Size:

There are some clues of the abundance of a rodent population such as:

Frequency and intensity of rodent presence signs as shown previously

Visual sighting of the rodents especially seeing rats during day which is a sign of a high population

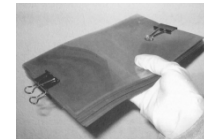
Precise estimate of a population is very difficult. Now the most important is to record the variation (increase or decrease) over the time and to **assess the efficacy of the Rodent Management measures while measuring the reduction of the population**. The most useful tools for that purpose, either alone or in combination, are:

Track plates with ink, talc, lampblack or sand

Monitoring tracking powder with UV marker

Game camera

Monitoring baits with or w/o a UV marker







Rodent Inspection and Monitoring

# *Implementing a Monitoring Sequence*





# Implementing a monitoring sequence

oSchedule a monitoring sequence of visits after the initial inspection. Optimally these visits should take place 1 day, 3 days, 7 days and 3 weeks after the inspection.

## **During each visit :**

Record the efficacy of the preventative measures

- Sealing of the access points
- Removing food and water sources
- Removing shelter and nesting areas

Identify any new sign of presence

- Fresh droppings, urine, gnawing, paths and runs, ...

Estimate the efficacy of the control measures

- Assess the frequentation of the bait stations, traps, glue boards
- Record and remove any dead body found
- Estimate the remaining population of rodents

Adjust the preventative measures if necessary in particular by sealing any new entry point

Adjust the control measures

- Adapt the placement of the bait stations if necessary and replenish them
- Change the traps and glue boards and adapt their placement if necessary



# Summary

## 1. Why do an inspection ?

The inspection forms the **basis** of your rodent control program – spending the time to do it right, and educate the customer is crucial.



Identifying and managing rodents is not easy as rodents are smart and infestations can occur across a wide area. Certainly a thorough inspection for rodent activity will greatly improve the chances of success and **reduces the risk of customer complaints and call-backs.**

# Summary

## 2. Take-away messages



A thorough inspection is critical for ongoing successful rodent management. It is instrumental of a correct IPM approach



There are a number of inspection tools, so use these where appropriate. Always record and report the signs of rodent activity and level of infestation.



Determining the rodent species will give you clues to where to focus your inspection and appropriate management approach.



Conducting inspections is a detailed process involving the exterior, interior, pipes, adjoining and sub-structures, as well as basements and inside equipment and fixtures.



Documenting and reporting the rodent inspection with a site diagram and inspection checklist is critical.





Rodent Inspection and Monitoring

*Thank You!*

