

# Introduction to Bed Bugs

# Outline

- What they are
- What they eat
- Where they live
- How to think like a bed bug
- Prevention
- Monitoring and inspection
- Assessment-based control

Also known as...  
chintzes or chinchies  
mahogany flats  
red coats  
crimson ramblers  
wall lice  
the bug that nobody knows



# What is a bed bug?

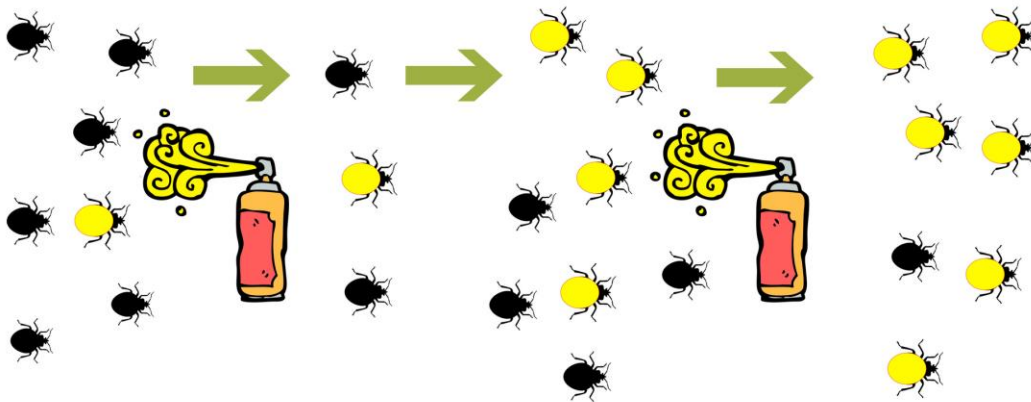
- A blood-sucking insect
- Flat
- Range in size from a sesame seed to an apple seed
- Light brown to mahogany red (depends on when they last fed)



**An adult bed bug feeding on a human**

# Why they're back

- Change in pesticide availability
- Change in pesticide use patterns
- More travel/ mobility of people
- More infested locations
- Lack of preparedness of society in general
- Pesticide resistance



## Pesticide resistance:

- Within 2-20 years insects show resistance to new pesticides
- More pesticides are needed to do the same job
- Requires PMP to switch products

# Pyrethroids and DDT

- Initially, bed bugs were well controlled with DDT (1940s), but resistance was seen within 8 years of its use
- Today, resistance is well-documented and widespread to DDT and pyrethroid insecticides
- Pyrethroids remain a primary control tool for bed bugs***



# Bed bugs are a pest of public health significance

- Result in stress, loss of work, loss of productivity, loss of sleep, and financial burden
- Cause secondary infections after people scratch their bed bug bites
- Are unwelcome in our homes and workplaces
- Bed bugs do not transmit disease *under normal living conditions.*





# Biology



Bed bugs mating



Close up of eggs

- Female bed bugs lay less than 200 eggs in a lifetime; 1-5 eggs per day
- From egg to adult – 5 weeks to 4 months
- molt 5 times; feed before each molt



Adult and nymphs

# Bed bug life cycle



**Fed**



**Not recently fed**



# The feeding process

Start

3 min

9 min

12 min



Photo: Whitney Cranshaw

# Bed bug behavior

- Most active at night
- Hide in cracks and crevices, often in groups
- Cannot fly, jump, or burrow into skin...they crawl
- Hitchhike on coats, bags, furniture, wheelchairs...



Photo: Dr. Dawn Gouge

**Bed bugs hiding in a screw hole**

# What bed bugs eat and drink

Blood





# Can be confused with...

- Ticks
- Cockroach nymphs
- Other kinds of bug bites
- Allergic reactions to chemicals



**Tick**



**Mosquito Bites**



**Cockroach Nymph**



**Bat Bug**

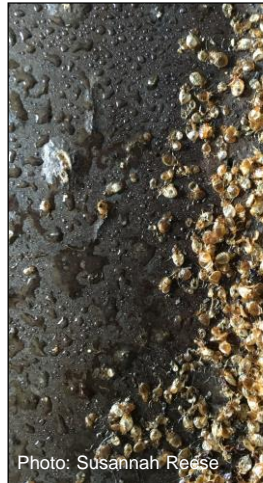


**Spider Beetle**



# Signs of bed bugs

- 🐛 Bites
- 🐛 Fecal spots
- 🐛 Shed skins
- 🐛 Dead bed bugs
- 🐛 Live bed bugs



# Bites

- Bed bugs cannot be confirmed by bites alone—Many people have no reaction
- Live bed bugs must be found
- Prefer feeding during darkness
- Bites often painless





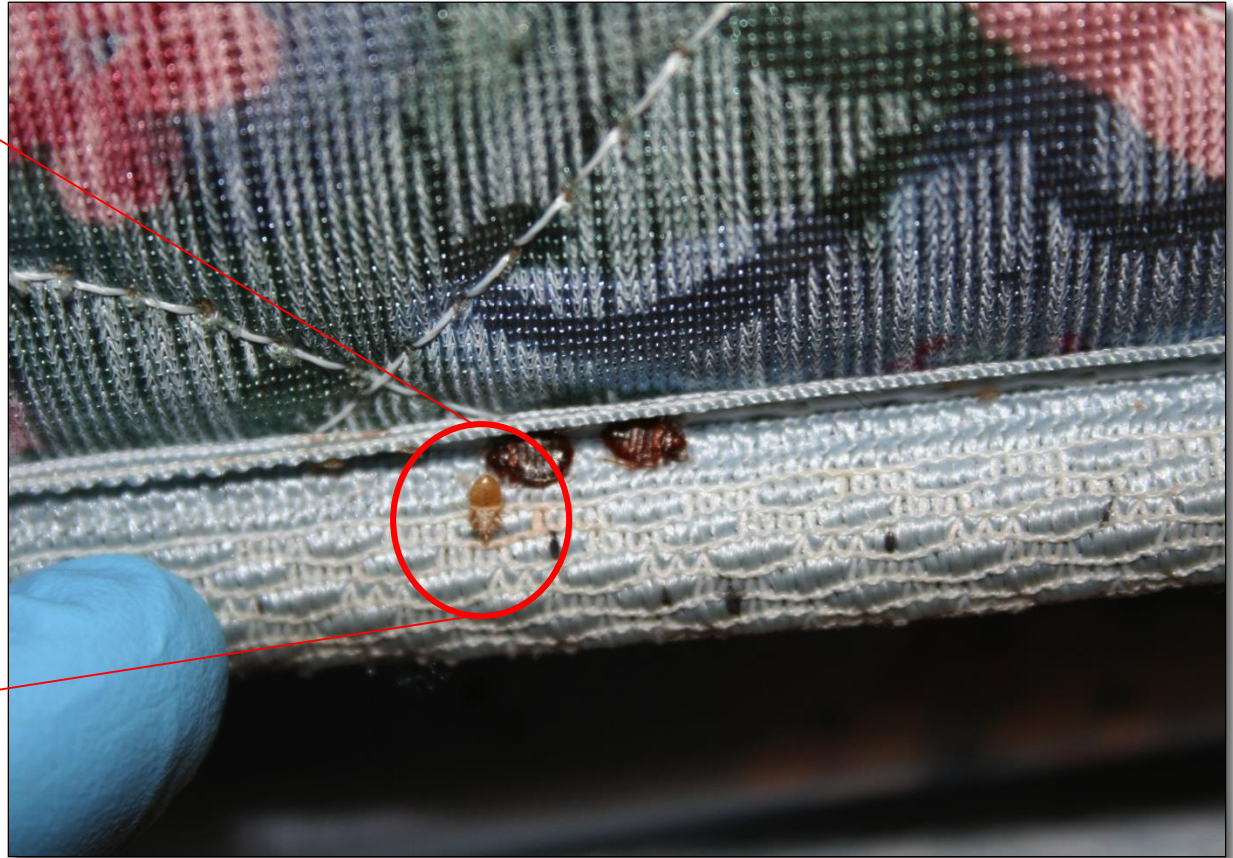
# Fecal spots

- Fecal spots are bed bug droppings
- Different from cockroach frass—frass is gritty, fecal spots are smooth.
- A current bed bug infestation cannot be confirmed by fecal spots alone
- Live bed bugs must be found



**A bad infestation**

# Shed skins



**Bed bug signs on a mattress seam**



# Dead bed bugs



**Bottom**



**Top**



# Where bed bugs live

- Only inside homes and buildings
- In any crack or crevice where a credit card edge could fit
- On any item near where people rest

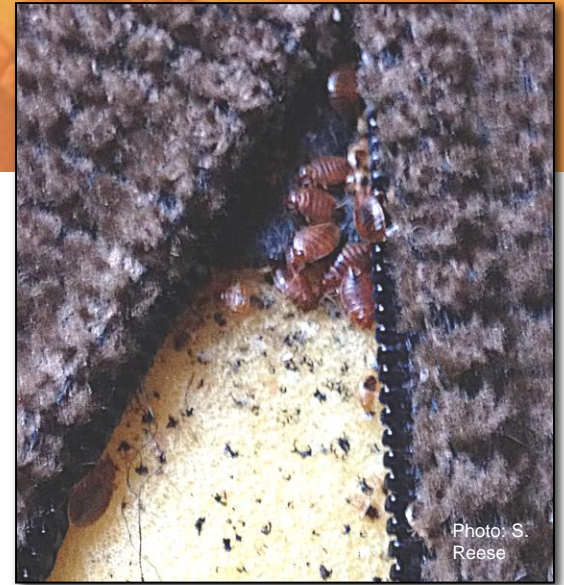


Photo: S. Reese

**Couch cushion zippers**



**Mattress piping**



Photo: Dr Dawn Gouge

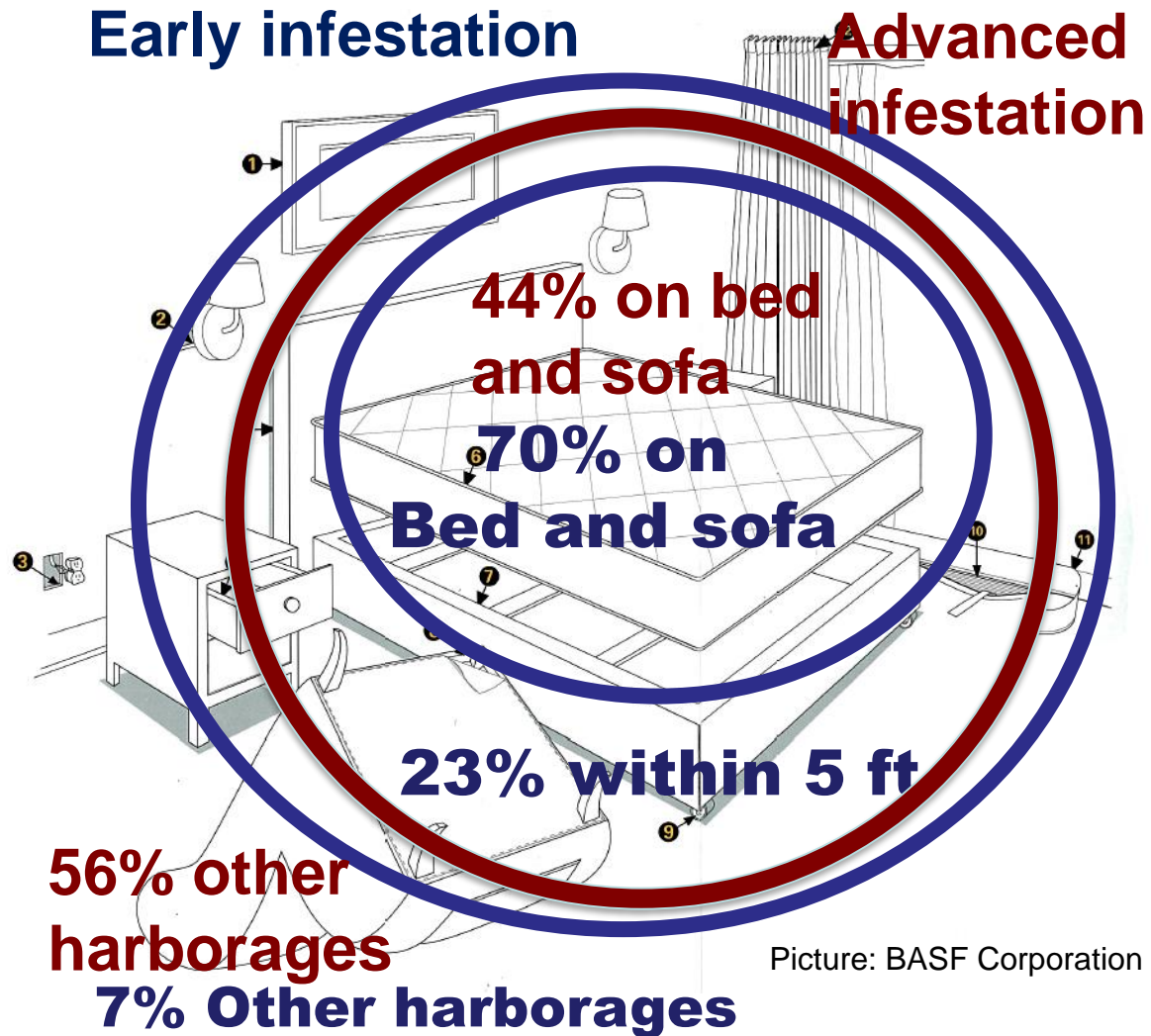
**Stuffed animals**



**Switch plates**

# Early detection is key

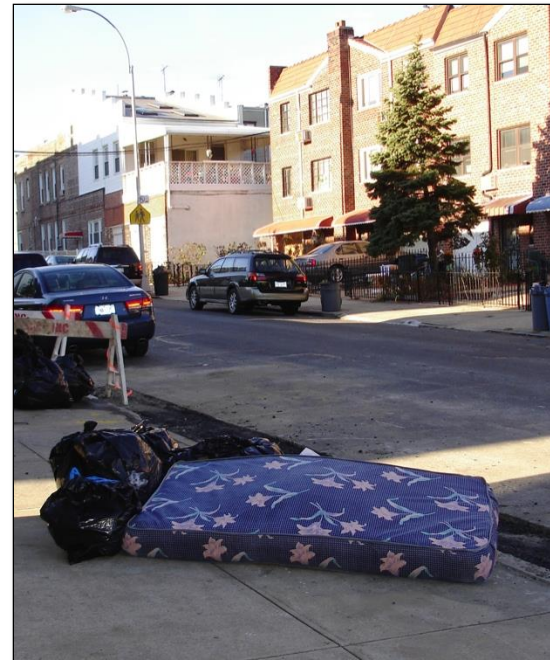
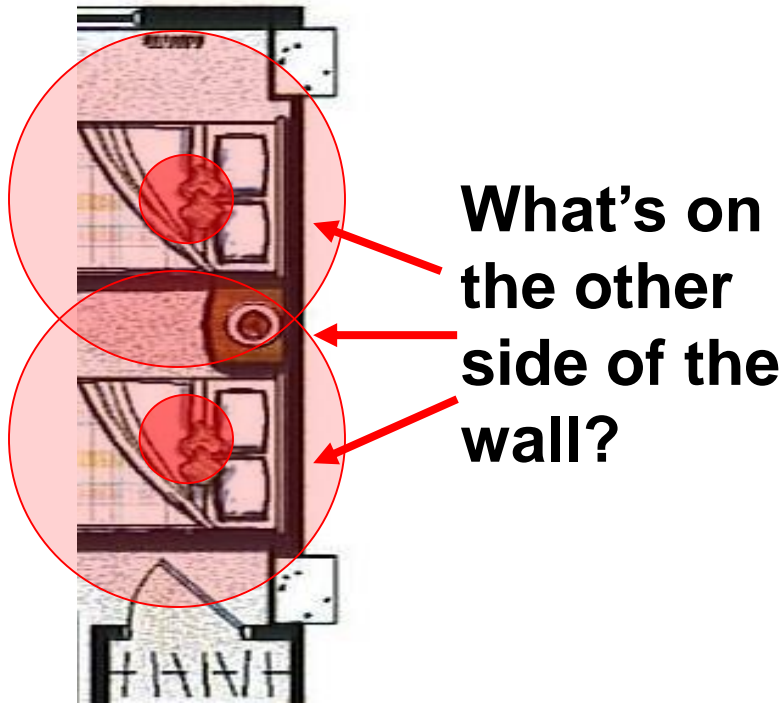
- Early infestations of bed bugs usually are on bed or within 5 feet of bed
- Advanced infestations spread away from bed, spreading problem
- Advanced infestations will cost more to control





# How do bed bugs spread?

- ☛ Actively crawl along wires, pipes, and under doors
- ☛ Passively on anything coming from an infested unit (furniture, backpacks, laundry...)





# Areas at risk for introduction and infestation

- Introduction is likely where people
  - frequently travel
  - set down personal belongings
  - sit or lay down for long periods of time
- Infestation is likely where bed bugs can
  - Crawl (upholstered furniture or bedding)
  - Feed on a person for 5 minutes without being detected
  - Hide in cracks or folds



# Advice for staff, health aides, and contractors

## In units:

- Prior to entering, use insect repellent
- Avoid sitting or placing items on potentially infested surfaces
- Wear a protective layer when moving infested items
- Inspect after leaving (can use lint roller)

## In the main office/community areas:

- Avoid fabric-covered furniture that has many crevices, if replacing purchase plastic or metal items
- Have residents set their belongings in plastic totes during meetings



# Prevent introduction and spread: residents

- Keep coats, backpacks, purses, and bags off beds, recliners, and sofas at home and while out
- Inspect used furniture carefully before bringing it home - avoid it if possible
- Look for signs when sleeping away from home

Smooth plastic totes can keep items bed bug free or contain items with bed bugs



# Do not rely on complaints

Many don't report because:

- They are afraid they will be charged \$ or evicted
- Are embarrassed to complain
- Are unaware of the signs
- May not react to bites

Use monitors  
and proactive  
inspection!





# Bed bug monitors

- Interceptors can detect up to 95% of infestations
- Trap and kill bed bugs
- Determine how bad the infestation is
- Two types
  - Passive
  - Active



Passive, moat-style interceptor (ClimbUp)



Passive, moat-style DIY interceptor from University of Florida/ IFAS Extension



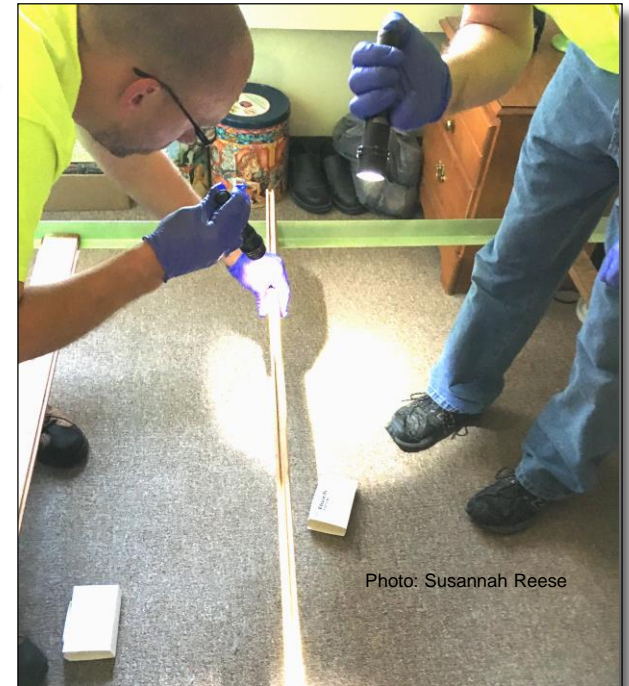
Active monitor, Includes lure (SenSci Activ Volcano)



Active monitor, plug-in trap, good for vacant units (verifi)

# Inspection

- Two types
  - Visual — always use a flashlight!
  - Scent detecting canine
- If bed bugs are found, inspect and place monitors in all adjacent units and across the hall.



# Canine inspections

- 🐛 Relatively fast, can detect low-level infestations
- 🐛 *Quality of inspection varies greatly*
- 🐛 Subject to false positives
- 🐛 Can be expensive

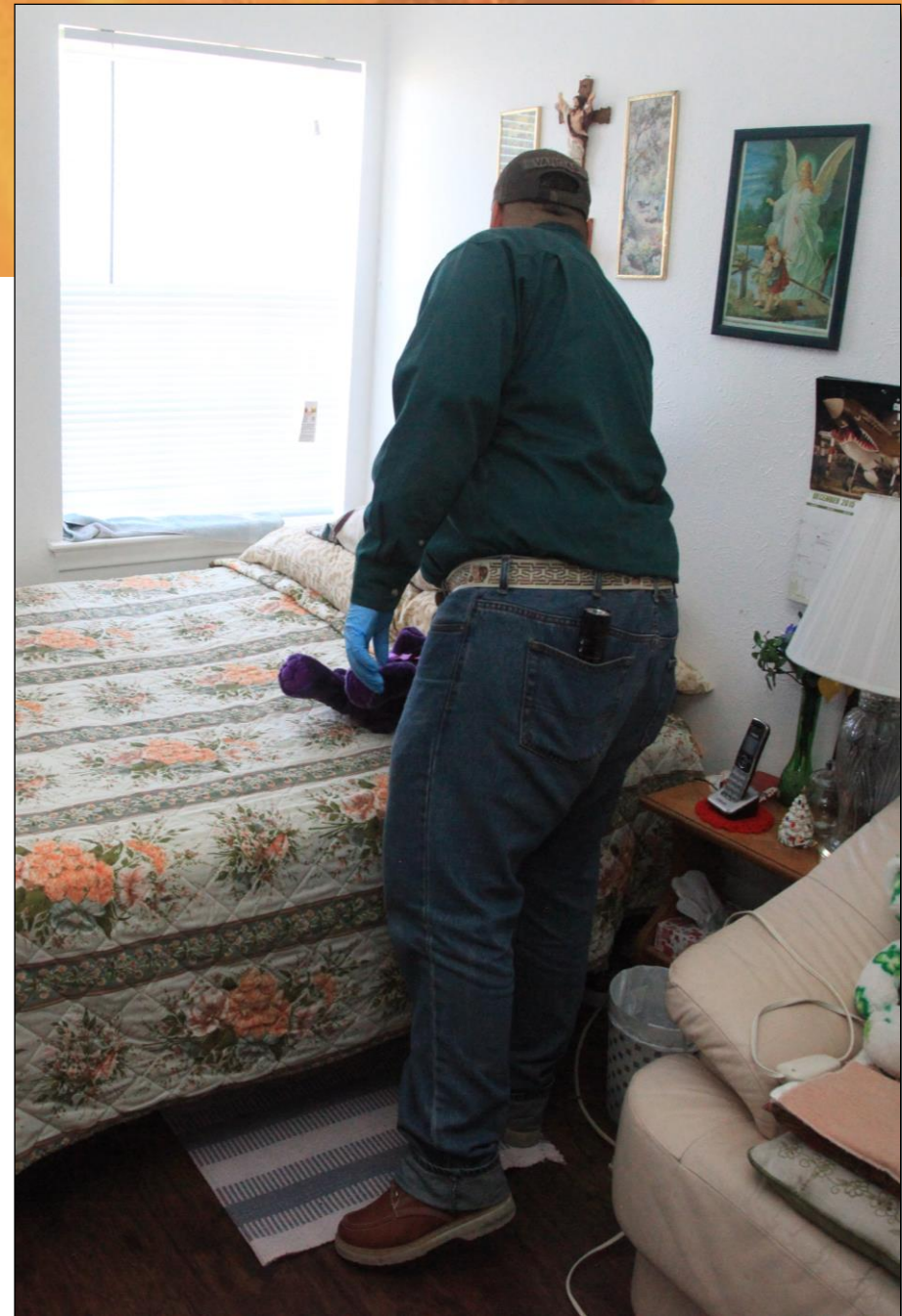
\*Speak to your StopPests Consultant for more information





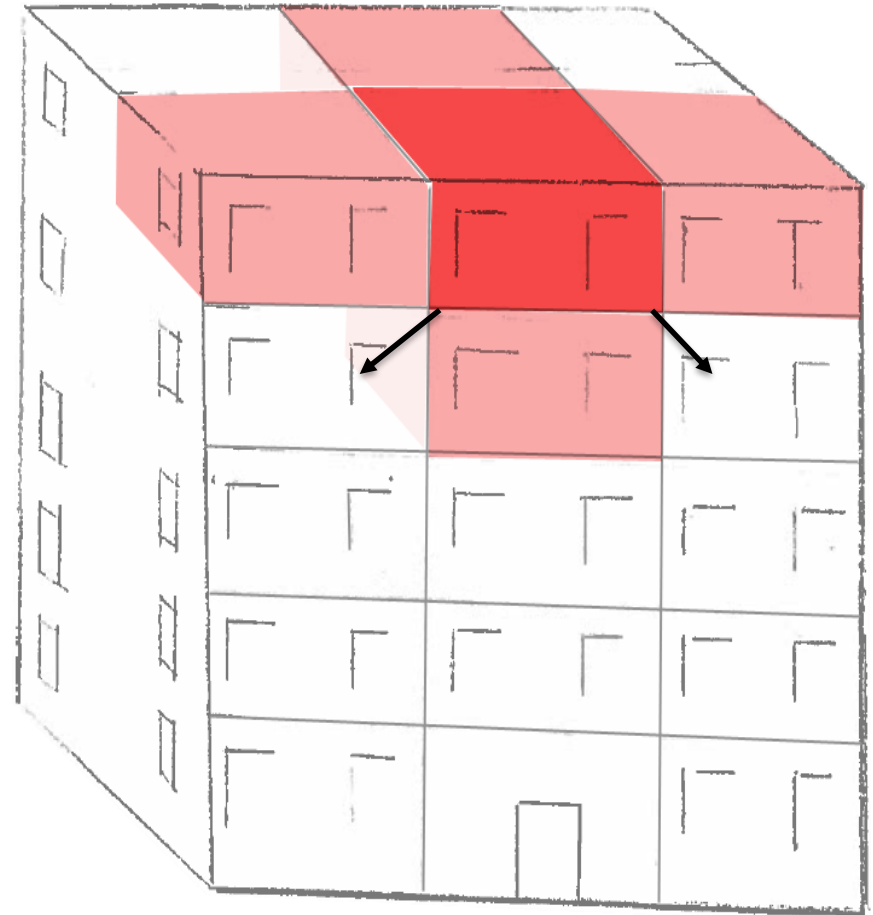
# Quick visual inspections of all apartments

- Staff conducts this inspection
  - Inspect beds and sofas only, focus on bed bug signs which are easy to detect
  - Faster than detailed inspections
  - Suspicious but no live bed bugs found? Leave interceptor traps



# What about neighboring units? Should they be inspected?

- All surrounding units should be *inspected*, monitored, and treated if necessary
- Depending on infestation level and construction, consider diagonal units as well
- No routine treatment of units without signs of bed bugs



# If someone finds a bed bug

Document all observations

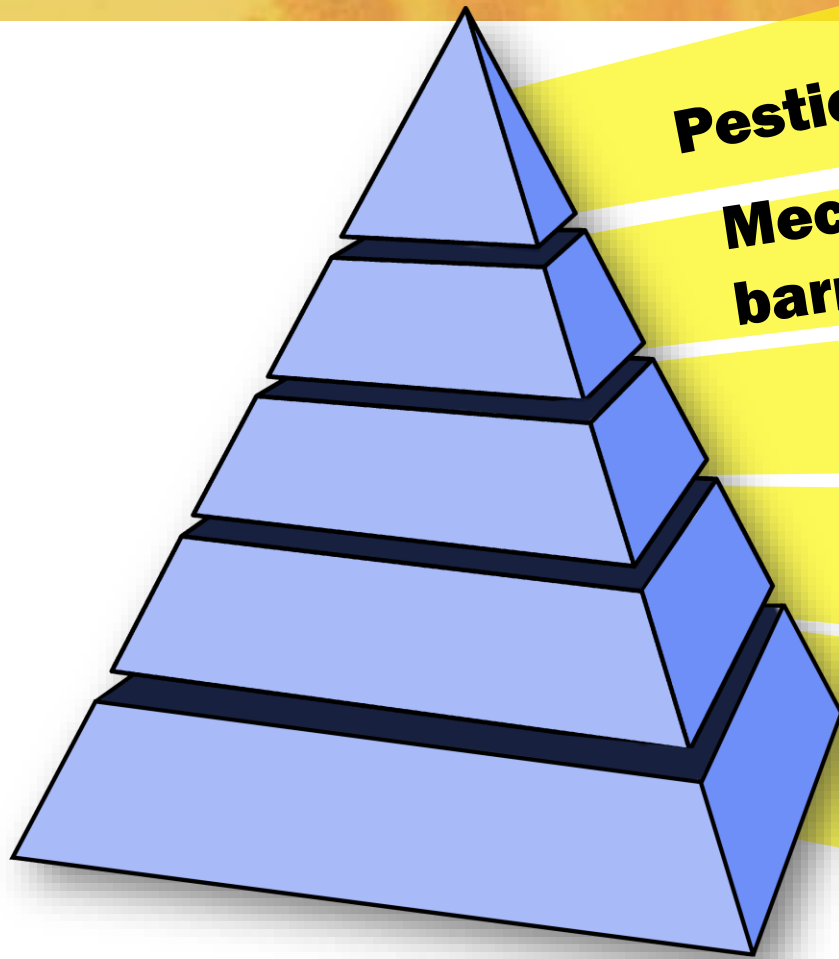
Rapid response plan:

- 🐛 Save the insect
- 🐛 Report the problem
- 🐛 Don't disturb the area
- 🐛 Don't apply pesticides
- 🐛 Prevent carrying the bed bugs to other places. **Don't discard furniture**
- 🐛 Have the PMP inspect the unit and adjacent units





# Integrated pest management for bed bugs



**Pesticides**

**Mechanical controls (encasements,  
barriers, vacuum)**

**Physical controls (heat, cold)**

**Pest proofing / Sanitation**

**Education and Awareness**

# Work with tenants

## 🐛 Key Messages:

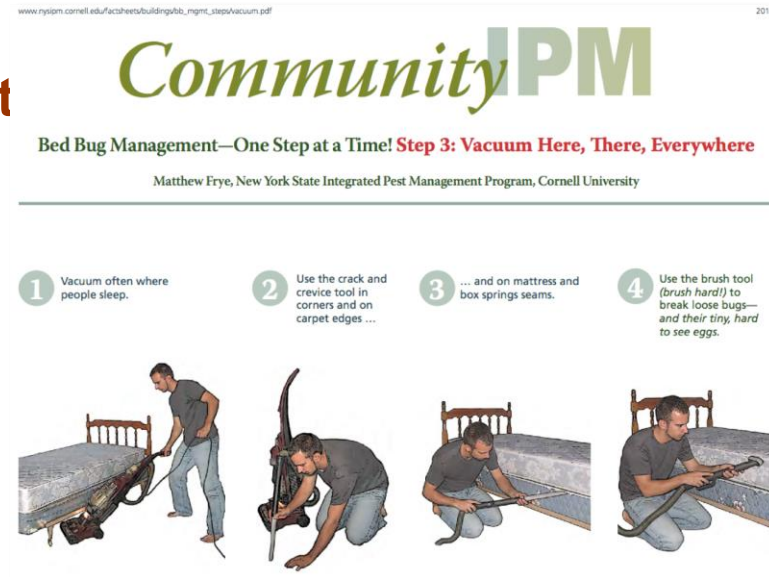
– Inspect, report, don't self-treat, don't throw out furniture or pick up discarded furniture, launder bedding regularly, and vacuum

🐛 Classes - Keep it simple.

🐛 Posters and brochures – help ID and encourage reporting

🐛 One-on-one intervention – when needed

\*Your StopPests consultant can provide you with good resources and materials for residents



New York State IPM Program created picture-based, step-by-step bed bug management instructions in English and Spanish for residents.  
[www.nysipm.cornell.edu](http://www.nysipm.cornell.edu)

# Work with tenants

- Clutter is the biggest customer-oriented challenge in treating bed bugs
- See [stoppests.org](http://stoppests.org) for resources and training on hoarding intervention





# Clutter image rating scale found in Compulsive Hoarding and Acquiring Workbook

- If preparation is required, communicate expectations to the resident using a visual rating scale



# Consider resident capabilities and preparation options

- Minimal prep is preferred
  - avoid moving furniture and bed bugs
  - low and moderate infestations less laundry
  - PMP guides customers on how to handle clothing, curtains, etc. after inspection



# Who is responsible?

- The PMP gives all instructions after inspection
- Assign realistic preparation responsibilities, taking into consideration the disabilities and financial, and physical limitations of those involved
- Instructions are ideally carried out by resident

## If they are unable

Family & friends

Building staff

Aides

Nonprofit groups

Contracted companies

## If they are unwilling

Fall back on lease, job description, or other existing formal agreement

**\*Talk to your StopPests consultant for guidance on preparation and working with residents**



# Encourage a community response

- 🪲 Educate everyone
- 🪲 Destroy discarded items
- 🪲 PHA could take the financial burden off of residents by providing
  - mattress encasements
  - monitors
  - proper furniture removal (if needed)



# Know your treatment options

## Vacuuming

## Isolation

- Encasements
- Clear bags
- Closed plastic containers
- Make the bed an island

## Freezing \*not as reliable as heat

- Chest freezer

## Heat

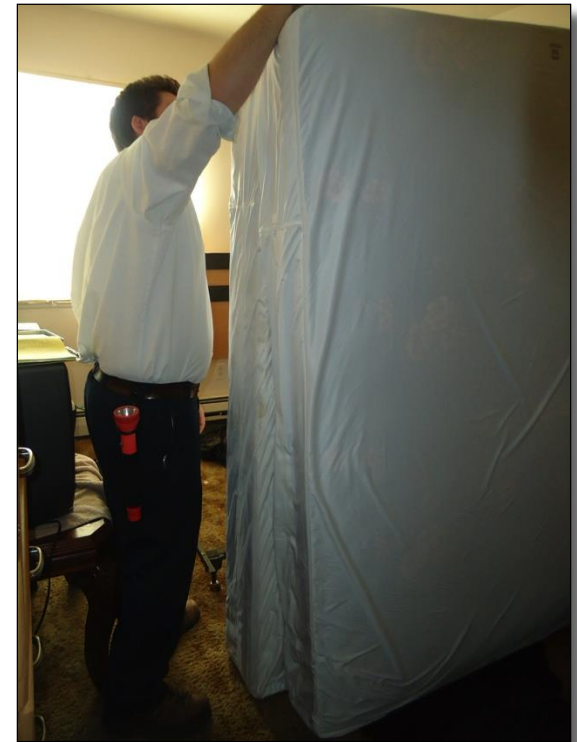
- Clothes dryer
- Steam
- Container
- Whole unit

## Pesticides

- Spray
- Dust
- Fumigation

# Mattress encasements

- Cover mattresses and box springs (even cheap plastic ones work)
- Ensure a snug fit, zip, seal, and check for rips
- Leave it on for 1 year
- Cover any sharp points
- Can eliminate the need to treat mattresses with insecticide
- Encases any remaining bed bugs so they cannot bite



Mattresses and furniture  
don't have to be thrown out!



# Non-chemical treatment options: Heat

- 🪲 Whole unit heat treatment
- 🪲 Portable heat chambers
- 🪲 DIY heat chamber  
(instructions from University of Florida)
- 🪲 Steam — (training needed)
- 🪲 Clothes dryers
  - free tokens or one machine designated *bed bug treatment only*



Building staff at a property in Pennsylvania test out their new ZappBug portable heat chamber.

# Steam



- Provides immediate kill of all life stages
- Penetrates into cracks and 1-2 cm into fabric, up to 6 cm in cracks
- No pesticide residue
- Slow!

# The role of the professional

- Must be trained and licensed to apply any pesticides
- Knows how to monitor, locate, and identify pests
- Experienced in what works and what doesn't
- Knows state laws regarding pesticide use



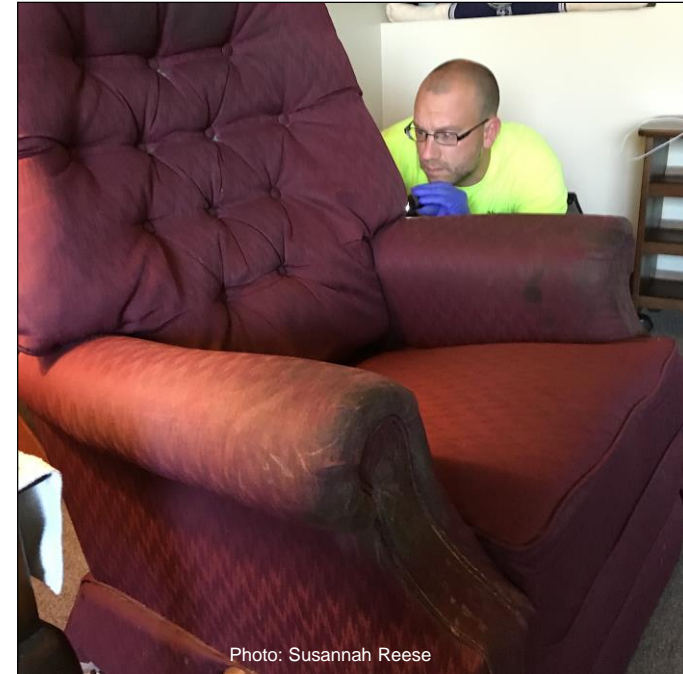
Housing  
staff can do  
bed bug  
control in-  
house if  
licensed

Picture: National Pesticide  
Information Center and Dr. Michael  
Merchant



# The PMP's role

- ALWAYS thoroughly inspects the reporting unit and the adjacent areas
- Provides site-specific preparation guidelines
- Follows the label
- Returns to inspect every two weeks and treat if bed bugs are found and follows-up until bed bugs are not found for two consecutive visits



# Find a good contractor and provide oversight

Property managers MUST:

- Oversee contractors
- Keep records of progress and reduction of pest population

PMPs MUST:

- Report monitoring results. How else will we know if treatment worked and the contractor is doing the job?

Both:

- Decide which units need attention (not complaint-based)
- Confirm elimination

<http://citybugs.tamu.edu/factsheets/biting-stinging/bed-bugs/>



# Pesticides

- 🪲 Only PMPs should use
- 🪲 Bed bugs tolerant of many insecticides
- 🪲 Types of formulations
  - Aerosols
  - Dusts
  - Fumigants
  - Sprays

Read the label!





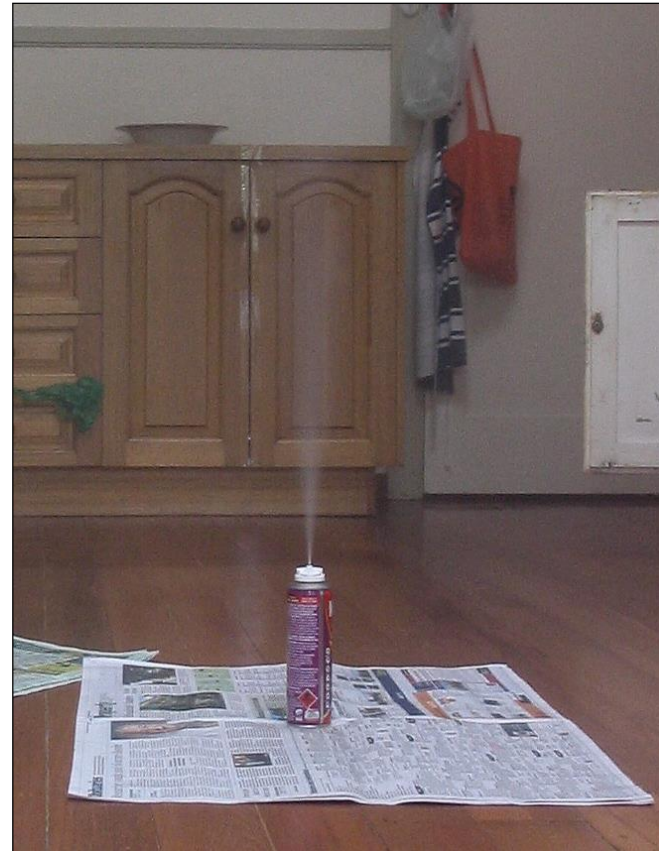
# Understanding chemical treatments

- 🪲 Bed bugs are resistant to many of the commonly used chemicals. There is no silver bullet.
- 🪲 Pesticide sprays have limited residual effect
- 🪲 Most sprays only work on contact
- 🪲 The most effective chemicals are combination products (neonicotinoids + pyrethroids)
- 🪲 Dusts are effective as long as they are kept dry

\*Ask your StopPests consultant for advice on product efficacy

# Only PMPs use sprays

- Sprays are not effective when used by homeowners/tenants for bed bug control
- Over-the-counter-sprays and foggers cause the bugs to scatter so the problem becomes harder to deal with



# Aerosols & Sprays

## Contact sprays

- Pyrethrins (several trade names)
- EcoRaider and Bed Bug Patrol
- Pyrethroid sprays (Zenprox, others)

## Residual sprays

- Aerosols such as Phantom (chlorfenapyr), Alpine (dinotefuran), or imidacloprid
- Combination sprays
  - Temprid, Tandem, Transport, CrossFire (Pyrethroid + Neonicotinoid)





# Dusts

- Most for wall void areas only
- Desiccants
  - Diatomaceous earth (pest control grade)
  - Silica aerogel (TriDie, CimeXa)
- Pyrethroid dusts
  - Tempo
  - DeltaDust
- Other dusts
  - Alpine



# Mix it up

- 🐜 Heat - steam, chamber
  - With optional residual insecticides
- 🐜 Pesticide-based
  - Barriers
  - Dusts
  - Residual sprays
- 🐜 Vacuum – all treatments



# A review of what you should do

- Educate everyone about what they can do to prevent bed bugs
- Prepare before bed bugs are reported by minimizing clutter and installing encasements and monitors
- Respond rapidly with a professional before the infestation grows and spreads



# Questions?

This presentation was edited and updated in August of 2017 thanks to additional slides and editing from **Michael Merchant, PhD**. Visit Dr. Merchant's website ***Insects in The City*** for more pest control resources here: <http://citybugs.tamu.edu/>

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And the StopPests team

