



# Sustainable Bed Bug Control in Low Income Housing

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# Overview

- Bed Bug Code of Practice
- Case Study - Australia
- Bed Bug IPM Research



Photo: Alex Wild

# Bed Bug Code of Practice

# What is a Code of Practice?

- A set of written rules which explains how people working in a particular profession should behave
- Affordable cultural practices
  - Residents
  - Housing admin
  - Regulators
  - PMPs

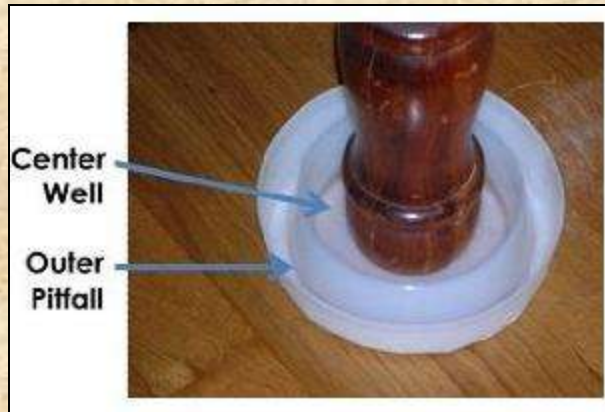


# Why do we need one?

- Resurgence
  - 1999-2006: 4,500% (Doggett 2010)
- Bed bug free?
  - Housing facilities want this
- Controlling bed bugs
  - Many methods
  - Constant need for education

# Infestation and Dispersal

- 101 apartments (45%) infested w/in 41 months
- Over four months, 78% trapped were nymphs
- An average of six bed bugs were trapped at apartment entry doors every four weeks



J. Econ. Entomol. (2010) 103:172-177

## Infestation and Dispersal

- Adult bed bugs were nine times more likely to disperse than nymphs
- 53% of adjacent apartments were infested
- 50% of residents who had infestations were unaware of the bed bugs in their apartments

J. Econ. Entomol. (2010) 103:172-177

# Bed Bug Working Group

- Increase collaboration
  - Research, extension, industry, government
  - Regional approach?
- Leverage resources
  - Increase funding
- Multistate Research Project (USDA)
  - NC-IPM Center Working Group Grant

# Bed Bug Working Group

## Objectives:

- I. Basic biology of modern bed bug populations
- II. Control efficacy against bed bugs
- III. Epidemiology and risk
- IV. Education and surveillance

Work in each of these areas could aid development of a Bed Bug Code of Practice for the U.S.

# Case Study - Australia

# Australia Code of Practice

- Pest management standard that defines and promotes best practices
- 1999-2006 few reports from low income housing (this changed after 2006)
- Greater efficiency with one comprehensive document? Avoid redundancy?

Insects (2011) 2:96-111



Photo: Alex Wild



National Center for  
Healthy Housing



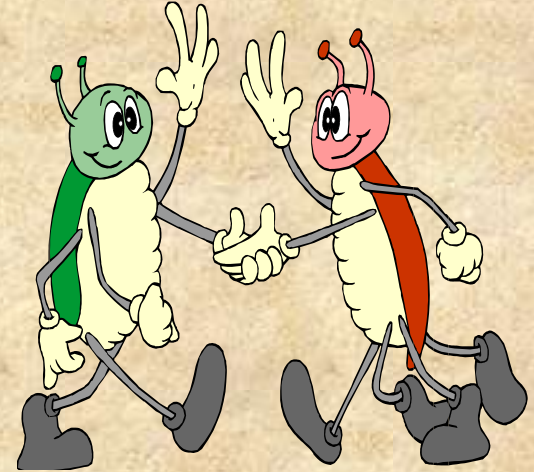
**What's Working for  
Bed Bug Control in  
Multifamily Housing:**  
Reconciling best practices  
with research and the  
realities of implementation

[www.healthyhomestraining.org/IPM/](http://www.healthyhomestraining.org/IPM/)

# Bed Bug IPM Research

# HUD-funded project

- Community-based IPM
  - Not an easy sell
    - ✓ Change
    - ✓ Little incentive?
- Cooperation is key!
  - Resident: reporting, clutter, prep
  - Management: education, coordination
  - PMP: inspection, treatment, follow-up



## HUD-funded project

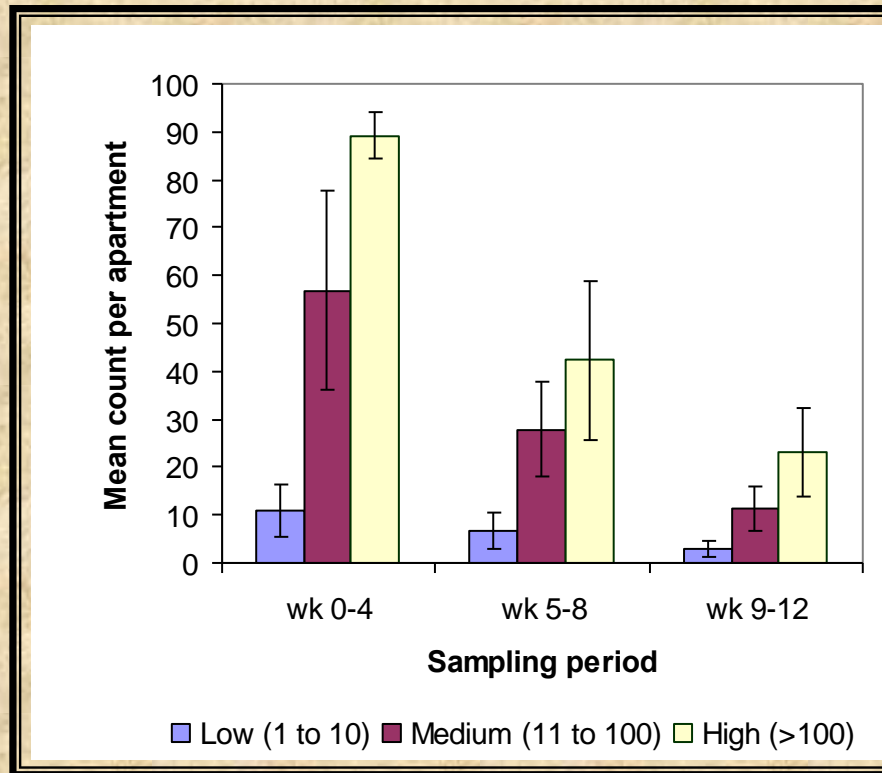
- Goal is to help establish an affordable, ongoing bed bug prevention and control program
- Challenges?
  - Cost, cooperation
- Opportunities?
  - Housing maintenance staff

## HUD-funded project



Can housing staff be more involved in monitoring and non-chemical controls?

# Reduction using trapping alone



J. Econ. Entomol. (2010) 103:172-177

## HUD-funded project

- Develop new, affordable, active monitors
  - Chemical lure
  - Carbon dioxide
  - Heat



J. Econ. Entomol. (2009) 102:1580-1585

## Conclusions

- Low income housing is at risk for establishment of persistent bed bug infestations
- A Code of Practice for the U.S. should be developed that focuses on best practices for bed bug prevention and control
- Bed bug prevention and control requires diligence and a community-wide effort



Photo: John Obermeyer

# Acknowledgements

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## Personnel

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Eva Chin-Heady



# Bed Bug Management

## Early Detection

## Rapid Response

Allie Taisey



# Outline

- 🐛 Integrated Pest Management (IPM)
- 🐛 Bed bug basics
- 🐛 Setting-specific bed bug management

# IPM sets you up for success

Building-wide IPM program controls all pests

- 🐛 Educate everyone to do their part
- 🐛 Inspect and monitor
- 🐛 Put a plan in place for rapid response
- 🐛 Evaluate effectiveness

# Don't forget other pests

Pests...

- 🐛 Decrease job satisfaction
- 🐛 Lower resident satisfaction
- 🐛 Bite and sting
- 🐛 Contaminate food
- 🐛 Transmit disease
- 🐛 Violate housing codes
- 🐛 Trigger/cause asthma and allergies
- 🐛 Lead people to overreact and ignore pesticide labels



**Cockroach infestation in a smoke detector**

# What all pests need

- Food
- Water
- Shelter

...and access



# IPM defined

In a structural setting, an IPM program consists of

1. inspection,
2. identification,
3. establishment of threshold levels,
4. employment of two or more control measures (which may be cultural, mechanical, biological, or chemical), and
5. evaluation of effectiveness

(Adapted from the National Pest Management Association's Urban IPM Handbook, 2006)

# Bed bug basics

# What is a bed bug?

- A blood-sucking insect
- Flat
- Wingless
- Reddish-brown after feeding



**Adult bed bug feeding on a human**

# Bed bug life cycle



**Unfed**



**Fed**



# Bed bug behavior

- 🐛 Most active at night
- 🐛 Usually feed at night
- 🐛 Hide in cracks and crevices, often in groups
- 🐛 Cannot fly, jump, or burrow into skin...they crawl
- 🐛 Hitchhike on bags, furniture, and coats
- 🐛 Crawl along wires, pipes, or floors



**Bed bugs often hitchhike on furniture where they went to hide**

# Bed bugs are health hazards

Bed bugs do not transmit disease, but they are a pest of significant public health importance because they

- cause secondary infections after people scratch their bed bug bites;
- result in stress, loss of work, loss of sleep, and financial burden; and
- are unwelcome in our homes and workplaces.

# Can be confused with...

- Ticks
- Cockroach nymphs
- Other kinds of bug bites



**Tick**



**Mosquito Bites**



**Cockroach Nymph**



**Bat Bug**



**Spider Beetle**

# Signs of bed bugs

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



**Bed bug signs on a mattress seam**

# Bites

- 🐛 Bed bugs cannot be confirmed by bites alone.
- 🐛 Live bed bugs must be found.



# Fecal spots or "blood spots"

- Fecal spots are bed bug droppings
- Bed bugs cannot be confirmed by fecal spots alone.
- Live bed bugs must be found.



**A bad infestation**

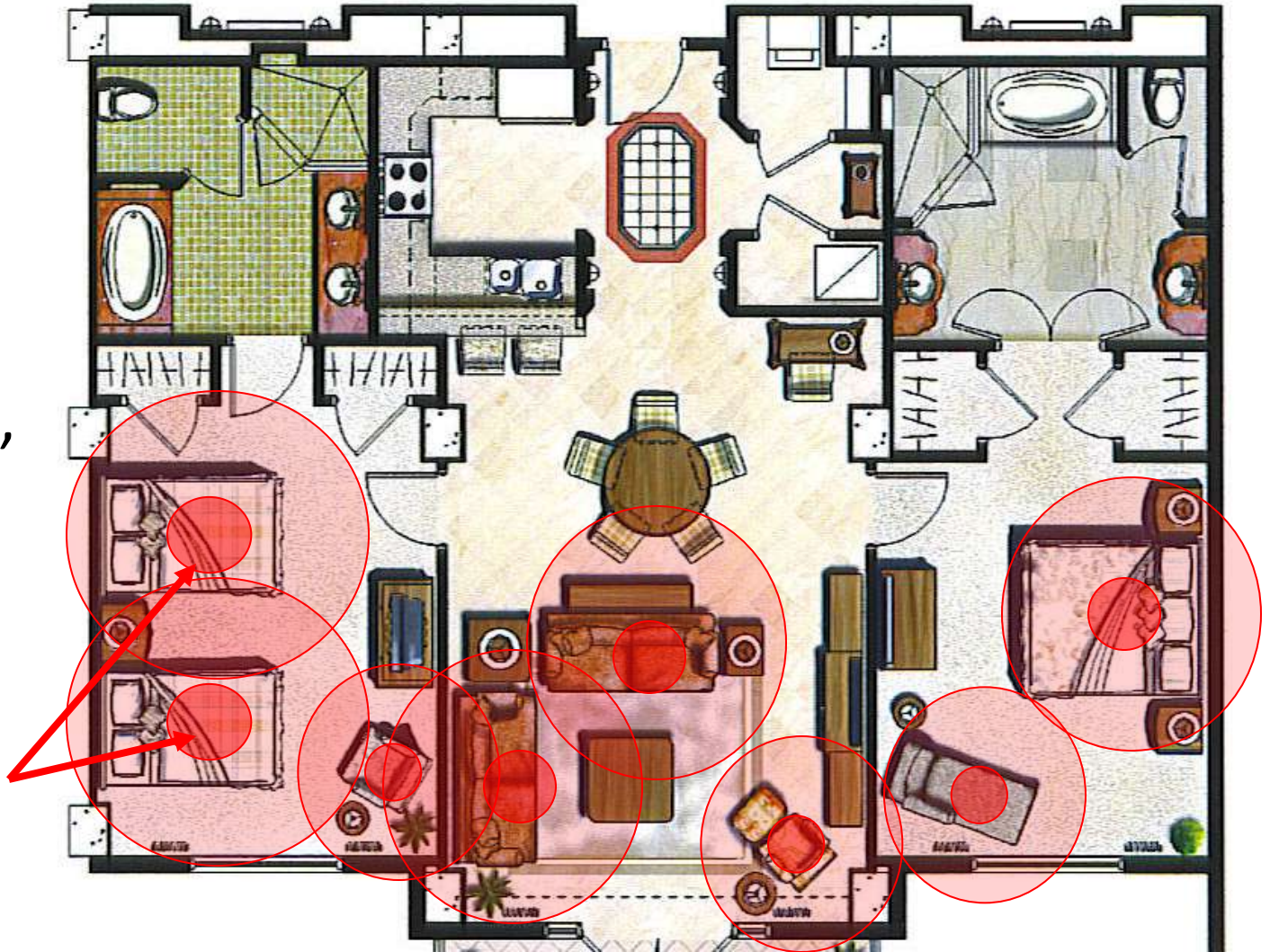


**The start of an infestation**

# Where bed bugs live

Beds,  
sofas,  
bedside  
tables,  
recliners,  
picture  
frames...

 = Hot Spot



# Inspect beds



# Inspect couches

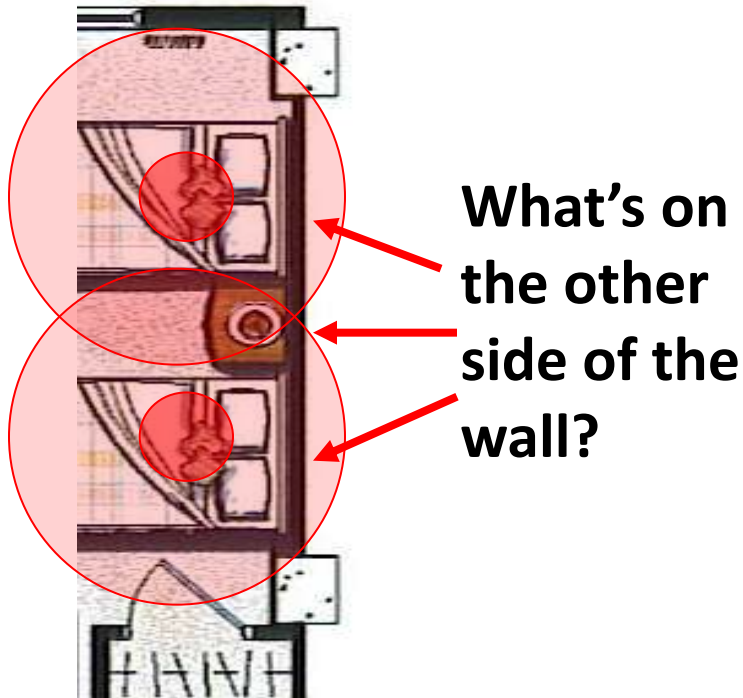


# Inspect chairs



# How do bed bugs spread?

- Actively through wall voids along wires and pipes or under doors
- Passively by hitchhiking on anything coming from an infested unit



# Inspect wheelchairs



# Got bed bugs? Now what?

If found and controlled early in the infestation, the spread of bed bugs can be stopped.

The first responses should be to:

- 🐛 Catch an insect for identification
- 🐛 Report the problem—keep records
- 🐛 **Not spray or bomb—leave this to the PMP**
- 🐛 Prevent carrying the bed bugs to other places



# Management methods

## 🐛 Inspections

🐛 visual

🐛 canine

## 🐛 Monitors

🐛 active

🐛 passive

## 🐛 Non-Chemical Treatment Methods

## 🐛 Pesticides



# Evaluate the effectiveness

- 🐛 Keep records
- 🐛 If bed bugs are found, where did the management plan fail?
  - 🐛 Neighboring units not addressed
  - 🐛 Poor preparation led to inadequate treatment
  - 🐛 Rushed PMP led to inadequate treatment
  - 🐛 Lack of education led to introduction
  - 🐛 The infestation was never fully eliminated

# Setting-specific



# Furniture recommendations

Light color



Metal, glass,  
or plastic

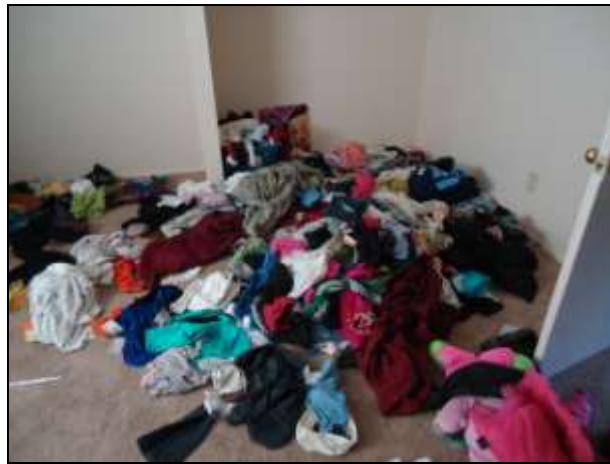


Not touching  
other furniture  
or walls



# Basic recommendations for housing

- Building-wide inspection and monitoring
- Education for staff and residents aimed at preventing introduction and spread
- Ongoing relationship with a qualified pest management professional (PMP)



# How to prevent getting bed bugs

## Advice for residents:

- Keep coats, backpacks, purses, and bags off beds, recliners, and sofas.
- Don't bring home used furniture.
- Look for signs before sleeping.



# How to prevent bed bugs

## Advice for staff

- In units:
  - Avoid sitting or placing items on potentially infested surfaces
  - Wear a protective layer when moving infested items
- In the main office/community areas:
  - Replace furniture with fabric and many joints with plastic or metal items
  - Have residents set their belongings in plastic totes during meetings



# How to prevent giving bed bugs

- Keep items carried out of the home isolated in plastic bags or bins outside of bedrooms and living rooms
- Kill bed bugs on items using
  - Careful inspection and physical removal
  - Laundry: 30 minutes in a hot dryer
  - Portable heat chamber
  - Commercial steamer
  - Freezing takes multiple days...



# Basic recommendations for schools

It's still IPM...

- 🐞 Inspect and monitor
- 🐞 Identify any pest found
- 🐞 Convene the IPM team to determine the necessary level of response
- 🐞 Take action
- 🐞 Evaluate results



# Understand the risk of bed bugs in schools

- Where are bed bugs most likely to be introduced?
- What about these areas are conducive to infestation?
- What can be done to prevent introduction and make the at-risk areas less conducive?



# Do not

- 🐛 Close the school
- 🐛 Send the child home
- 🐛 Allow untrained staff to apply pesticides



# Do

- Inspect items that come to and from school
- Implement storage practices that reduce the risk of bed bugs spreading
  - plastic totes
  - plastic bags
  - inspection
- Work with parents to ensure management is occurring at home



# Educate yourself

-  "What's Working for Bed Bug Control in Multifamily Housing"

[www.nchh.org/Portals/0/Contents/bedbug\\_report.pdf](http://www.nchh.org/Portals/0/Contents/bedbug_report.pdf)

-  NPMA's Best Management Practices

[www.bedbugbmps.org](http://www.bedbugbmps.org)

-  Federal Bed Bug Summit broadcast webinar

<http://www.epa.gov/pesticides/ppdc/bedbug-summit/webinar-instruction.pdf>

Questions?

# Bed Bug Heat Treatments

# Laundry



# Steam



# Steam



# Portable Heat Chamber



# Whole-Space Heat Treatment

