

BED BUGS

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MINI FORESTRY WORKSHOP



Mario David Bazan

OUTLINE

- What they are
- What they eat
- Where they live
- Prevention
- Monitoring and inspection
- Management



Bed bug nymphs, ~1mm

WHAT IS A BED BUG?

- Blood-feeding insect
- Flat
- Size range-sesame seed to apple seed
- Light brown to mahogany red



Laurie Kerzicnik

WHY ARE THEY AN ISSUE?

- Common before WWII
 - Practically eradicated in the US
 - DDT use and improved hygiene
- Resurged last 2 decades
 - More travel
 - Lack of knowledge about preventing infestations
 - Ineffective pest control practices
 - Resistance to three different classes of pesticides
- Detected in cars, trains, ships, rooms, and airplanes



WHY SHOULD WE CARE?

- Litigation
- Possibility of high treatment costs
- Social stigma
- Why are we talking about bed bugs at a forestry conference?

contagious fears by cta



www.funnytimes.com

HOW DO INFESTATIONS OCCUR?

- Great hitchhikers
 - Transported on luggage, clothing, beds, and furniture
- No real relationship between bed bugs and cleanliness
- **Turnover of residents**-important indicator of bed bug threats
 - Frequent relocation
 - Brief occupancy at places
 - Likely to stay at high-density accommodations
- Backpackers, homeless people, immigrants, and guest workers “targeted” as infesters



BIOLOGY/LIFE CYCLE

- Females lay about 200 eggs
- 1-5 eggs/day
- Egg to adult = 5 weeks to 4 months
- 5 nymph stages
- Molt (shed skin) 5 times
- Feed before each molt

Note: Bed bugs take 3-10 minutes to complete feeding

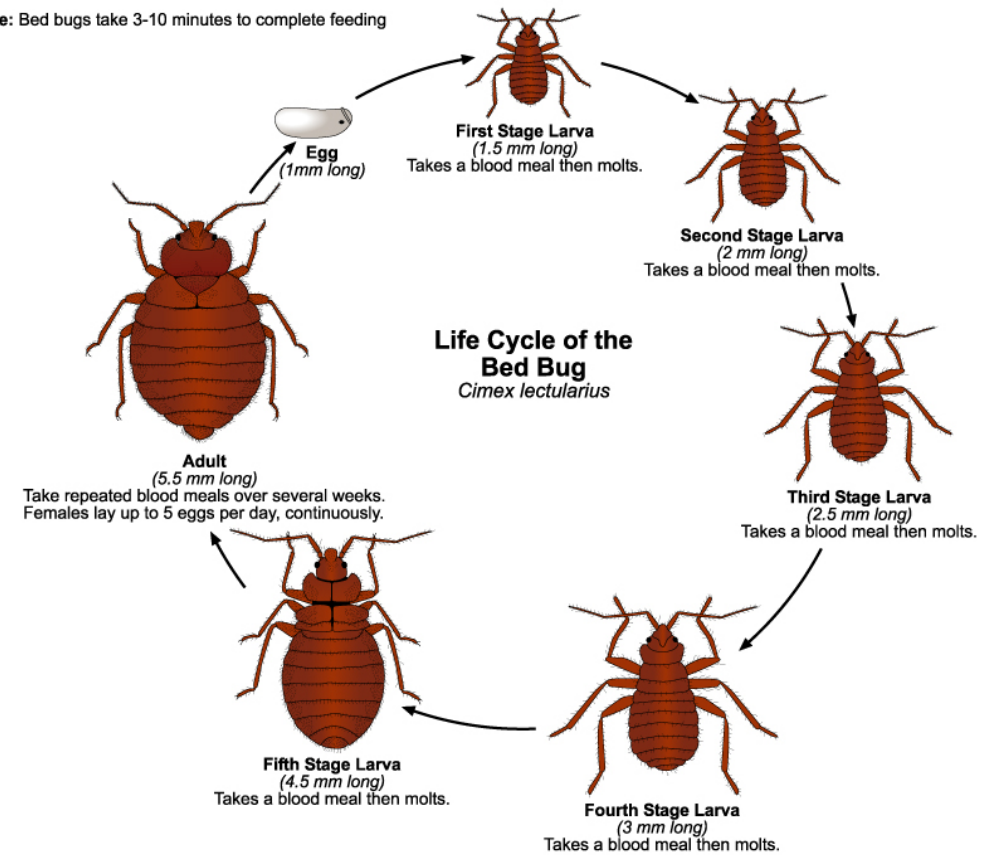


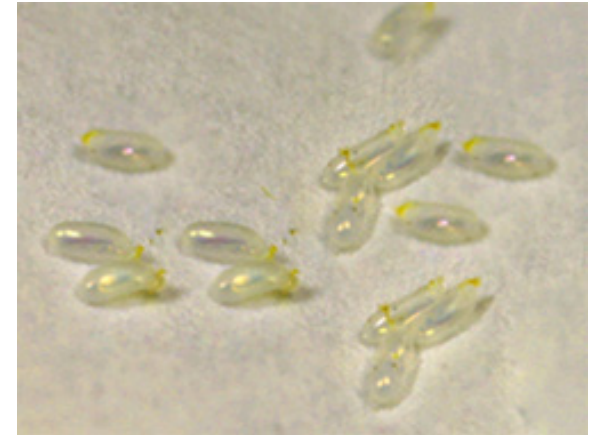
Illustration by: Scott Charlesworth, Purdue University,
based in part on Usinger, R. L. 1966, Monograph of the Cimicidae

LIFE CYCLE (CONT.)



BEHAVIOR/BIOLOGY

- Adults can survive without a blood meal for up to 18 months
 - Average for females-131 days; males-142 days
 - Nymphs (1st and 2nd instars)-84 days
- Frequency of feeding
 - Adults- about a week
 - Nymphs-can feed within 24 hrs
- Enter a state of rest by folding legs in and ceasing activity



BEHAVIOR/BIOLOGY

- Elongated stylet to pierce skin and draw blood
- Feeding required for mating & egg production
- Feed at night during the peak hours of 1am-5am-*deepest sleep*
- Feed on any areas exposed while sleeping
- A line of bites might appear close to the edge of clothing or a sheet
 - Pattern of “three bites” a myth
- Return to their resting refuge through the presence of an aggregation pheromone



BEHAVIOR/BIOLOGY

- Response is variable
 - Bite is not immediately felt
 - Bites most common on arms, legs, back, face, and eyes
- About 30% of people do not react when bitten
- People are reacting to the saliva bed bug introduces while feeding
- Itching usually happens within a week
- Cannot transmit pathogens



BEHAVIOR/BIOLOGY

- Flightless
 - Reduction of wings characteristic of cave-like species
- Temperature limitations
 - Thermal death point between 111-113°F
 - Development tends to cease at 97-99°F
- Relative humidity variable
 - Found in areas with RH between 10-70%



Madrid bed bug infestation

BEHAVIOR/BIOLOGY

- Aggregation pheromone attracts other bed bugs for grouping and water conservation
 - Clear evidence of fecal spots
- *Thigomotactic*-body likes to be in touch with rough surfaces
- Odor is referred to as an “obnoxious sweetness”
- Group together in cracks and crevices



BEHAVIOR/BIOLOGY

- Hosts
 - Humans (followed humans everywhere!)
 - Chickens, bats
- Hide during day & close to humans
- Emerge from refuges through triggers of carbon dioxide or increased body temperature from humans
- They will travel from 5 to 20 feet to reach a victim
- Do not reside on people
 - A single bed bug will typically feed every 3-5 days for 5-10 minutes
 - Leave quickly after feeding
 - Remain motionless for several days after feeding



SCHUTTER LAB BED BUG AND BAT BUG IDENTIFICATIONS 2008-2018

■ Bed bugs

- 23 counties
- 46 identified

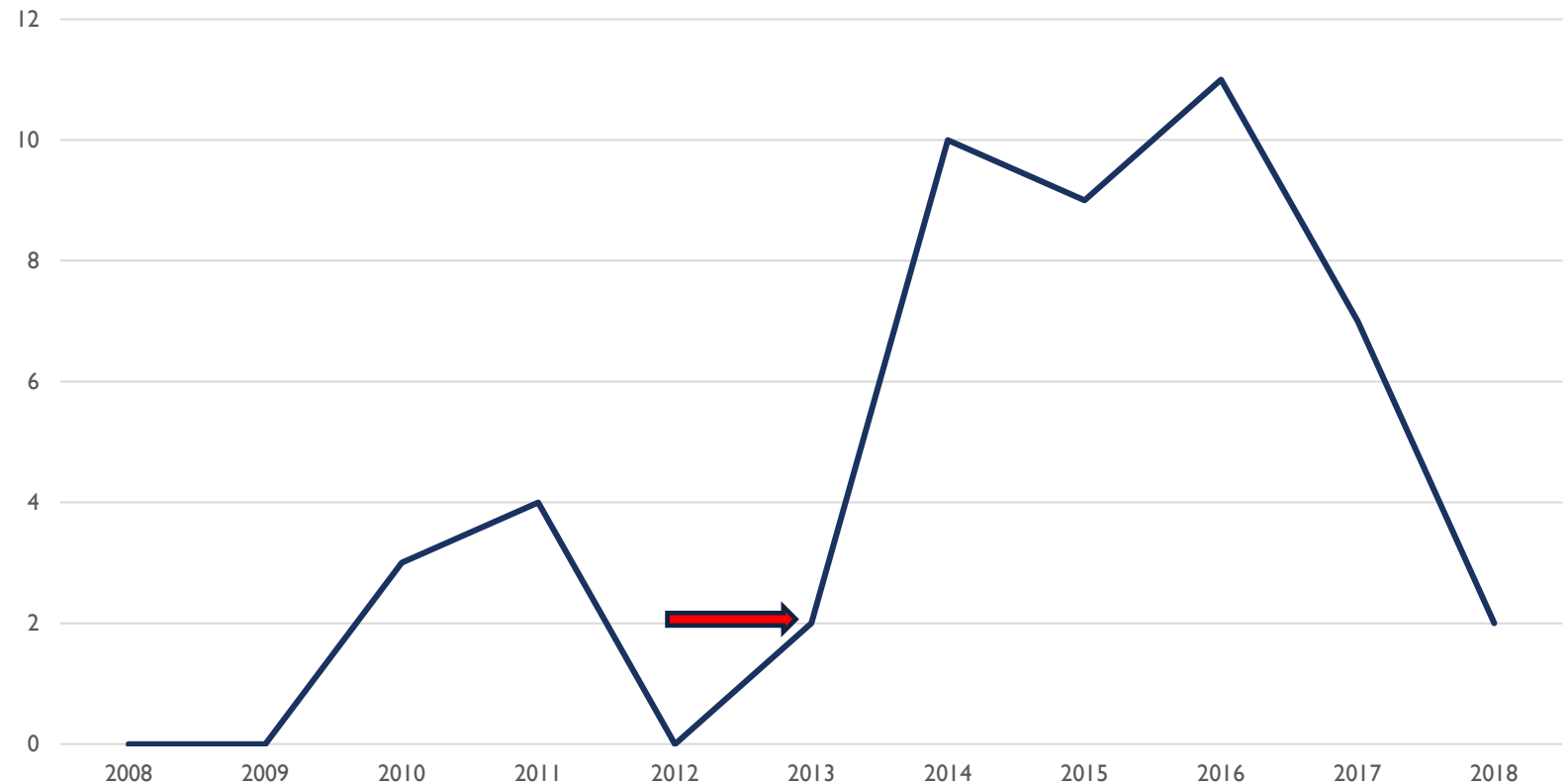
■ Bat bugs-*Cimex* sp.

- 17 counties
- 48 identified

■ Swallow bugs

- 6 counties
- 8 identified

Number of Bed Bugs Identified
Schutter Lab 2008-2018



WHERE BED BUGS LIVE

- Located in areas where blood meals are easily obtained
 - Furniture
 - Torn wallpaper
 - Mattresses, bed frames, picture frames
 - *Any area close to the bed or couch that contains cracks or crevices*
 - Prefer wood surfaces over metal/plastic
- Only contact with humans is for a blood meal
- Hitchhike on coats, bags, furniture, wheelchairs...



WHERE BED BUGS LIVE

- Do not have nests
- Hide in seams, folds of mattresses, box springs, bed frames, headboards
- During high infestations, a pungent sweet odor can persist throughout the room



FECAL SPOTTING

- Liquid fecal matter excreted very soon after feeding
- Common spots:
 - Mattress, bed linens, curtains, wallpaper, surrounding bed

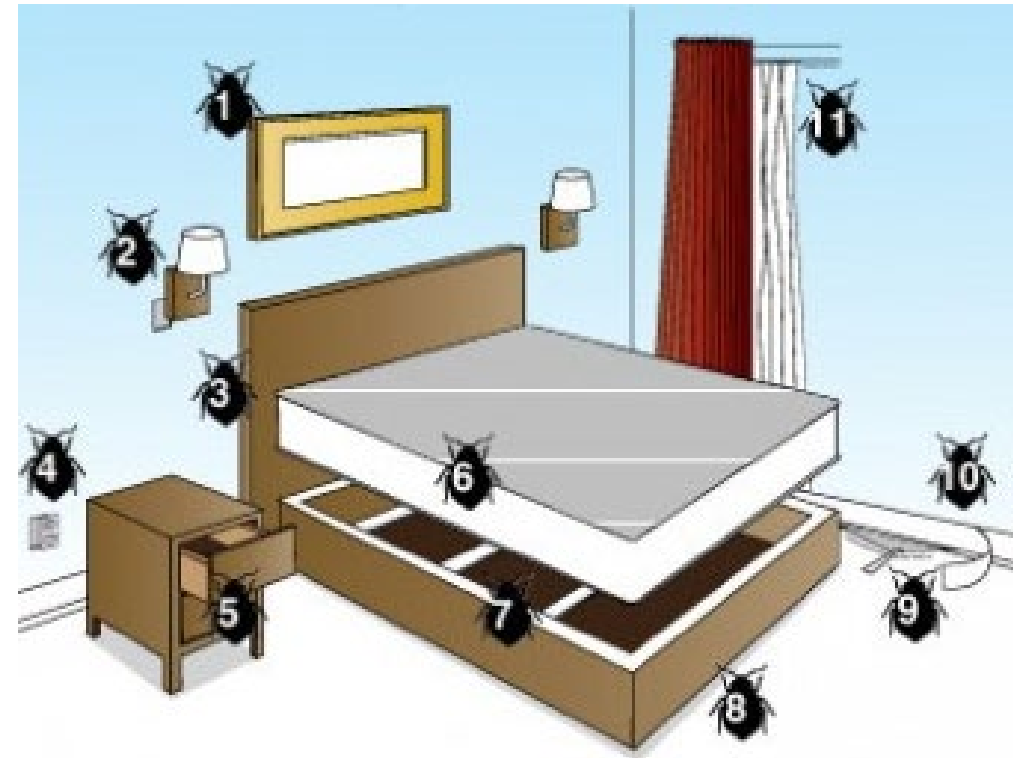


SHED SKINS



INSPECTIONS

- Cracks and crevices of bed frames (particularly wood)
- Wooden support slats
- Screw holes, knots, and other recesses
- Headboards
- Upholstered chairs, recliners, and sofas



INSPECTIONS (CONTINUED)

- With a flashlight, thoroughly inspect the entire room before unpacking
 - Behind the headboard
 - Under lights
 - Inside dressers, sofas and chairs
- Pull back sheets, inspect mattress seams and box springs (particularly at the corners)
- Avoid placing luggage on upholstered surfaces or luggage racks
- Vacuum luggage thoroughly before storing it
 - Garment hand steamer
 - Wash and dry all clothes – even those that have not been worn – on hot cycles



HOW TO IDENTIFY BED BUGS

- Identified under a microscope by a trained professional
 - Schutter Diagnostic Lab
- Separated from other insects
 - Flattened dorsal-ventrally
 - Obligatory blood feeders
 - No wings
- They are identified and separated from bat bugs based on “fringed hairs” on a segment of the body called their pronotum



BED BUG VS. LOOK ALIKES



Bed bug
Cimex lectularius



Bat bug
Cimex adjunctus



Swallow bug
Oeciacus vicarius

BED BUG IMPOSTERS



© Marci Hess

Carpet Beetle
Dermestes lardarius, (8mm)



Tom Murray

Minute Pirate Bug nymph
(1.5mm)



Sharon Warner

Boxelder Bug nymph
Boisea trivittata (2mm)



Laurie Kerzicnik

Rocky Mountain Wood Tick
Dermacentor andersoni (5-6mm)



Laurie Kerzicnik

Root Weevil (1mm)

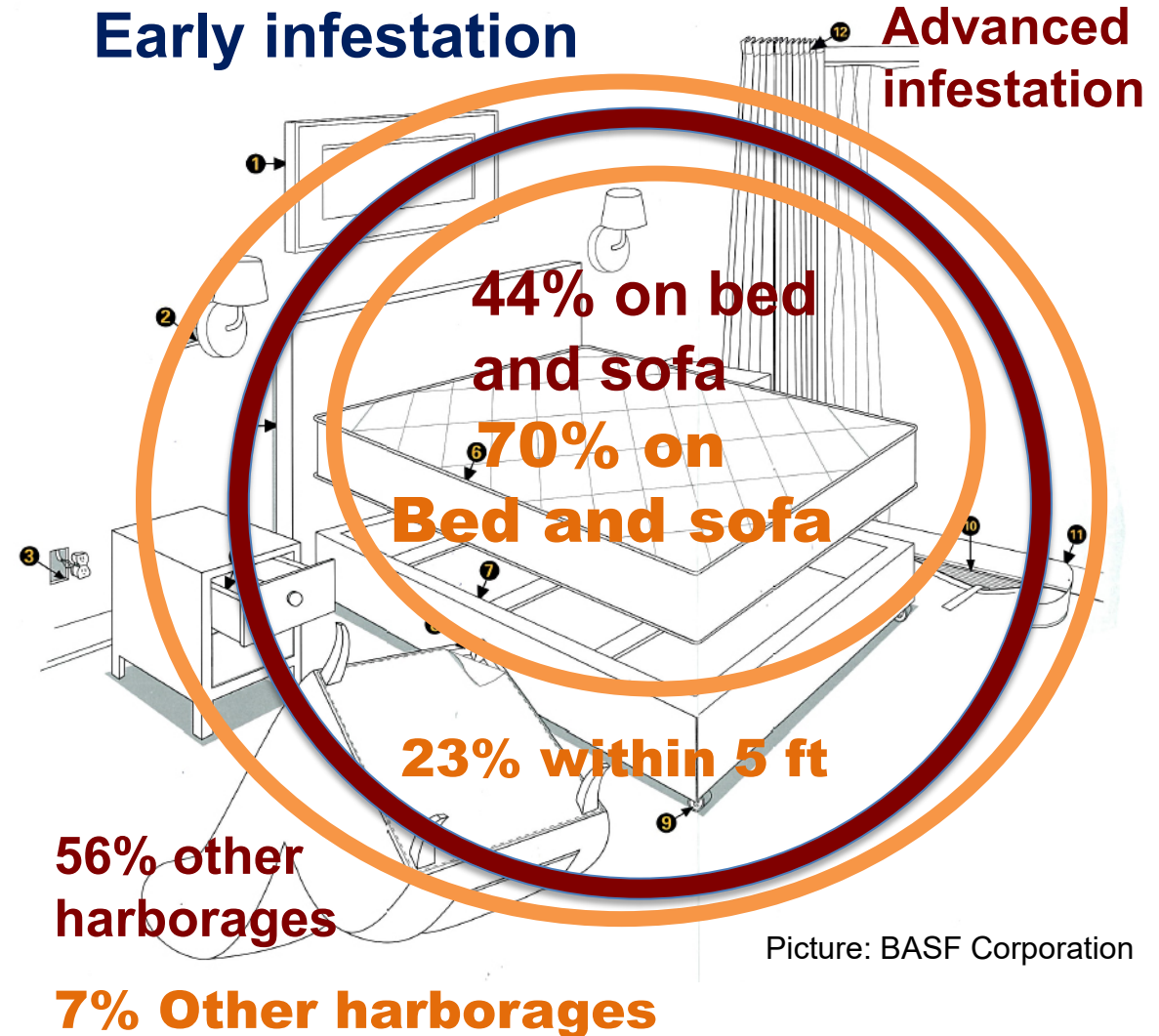


cwhitl

Book Louse (1mm)

Early detection is key

- Early infestations usually close to the bed
- Typically take 2-3 treatments
- Advanced infestations spread and cost more to control
 - 5 or more treatments



MEASURES FOR PREVENTION

- Train staff and tenants
 - Inspections
 - Bed bug identification
 - Procedures
- Periodic inspections (beyond yearly health inspection requirement)
- Elevate suitcases off of the floor and bed
- Bed bug monitoring traps
- Reduce clutter



BED BUG INTERCEPTORS

- When combined with visual inspections, can detect up to 95% of infestations
- Small plastic trays with an inner and outer ring
- Place under the bed posts or under bed



Passive monitor



Active monitor (SenSci Activ Volcano)

TREATMENT OPTIONS

- Vacuuming
- Mattress Encasements
- Freezing *not as reliable as heat
 - Chest freezer
- Heat
 - Clothes dryer
 - Steam
 - Portable heat chambers
 - Whole unit
- Pesticides
 - Best to use a pest management professional
 - Formulations
 - Spray
 - Dust
 - Fumigation

TREATMENT

MATTRESS ENCASEMENTS

- For mattress and box spring



TREATMENT

HEAT

- Whole unit heat treatment-(training needed)
- Portable heat chambers
- Steam – (training needed)
- Clothes dryers — 30min on high



TREATMENT

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!

TREATMENT PESTICIDES

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

The label is the law!



UNDERSTANDING CHEMICAL TREATMENTS

- No silver bullet
- Pesticide sprays have
 - Limited residual effect
 - Only work on contact
- Most effective chemicals
 - Combination products (neonicotinoids + pyrethroids)
- Dusts effective if kept dry



ONLY PEST MANAGEMENT PROFESSIONALS SHOULD USE SPRAYS

- Sprays not effective when used by tenants/homeowners
- Over-the-counter-sprays and foggers cause bugs to scatter
 - More of a problem



WHAT TO DO IF YOU FIND A BED BUG

- Notify hotel/building owner/landlord right away
- Save the insect
- Have it properly identified
 - Local extension agent
 - Schutter Diagnostic Lab
- Don't disturb the area
- Don't apply pesticides
- Prevent carrying the bed bugs to other places **Don't discard furniture**
- Landlord/building owner's responsibility for treatment

Sample#	20160043
Field ID	
Host	House insulation
Received Date	3/16/2016
County	Sweet Grass
State	MT

DIAGNOSTIC REPORT

Submitter: Marc King 515 Hooper St. P.O. Box 640 Big Timber MT 59011-0640 Phone 406-932-5146 Fax 406-932-5270 Email mking@montana.edu	Contact: Ron Thomas P.O. Box 812 Big Timber MT 59011 Phone 932-5413 Fax Email
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Diagnosis and Recommendations

Host/Habitat	House insulation
List of Diagnosis ID(s)	
Confirmed for Carpet Beetles (Family Dermestidae)	

Final Report

Hi Ron,

Diagnosis: The insects you submitted are the immature stage (or larvae) of a carpet beetle.

Pest description:
They are home-invading pests. They are classified as detritivores/decomposers, breaking down materials into nutrients, etc. Almost everyone has a few of these in their homes, so they are very common. They are harmless to humans and do not carry any diseases.

Life cycle:
Since they are beetles, they have a four-stage life cycle, including egg-larvae-pupae (immobile)-and adult. The only damaging stage is the larval stage, which has a wide feeding range, including feathers, dead birds, birds' nests, dry carcasses, grains, insulation, cereals, carpeting, upholstered furniture, wool blankets, books, pet food, and clothing.

Adult beetles fly readily, are attracted to daylight, and are often found on window sills. In late spring, they will try to make it outside to feed on pollinating flowers. The females will each lay about 100 eggs in floor walls, floor cracks, baseboards, clothes piles, and furniture covers. In warmer weather, these eggs will hatch, and the larvae will search for food (like those sources listed above). They will feed voraciously. They will crawl behind baseboards, wall spaces, and may assemble in large groups. They will go through several larval growth stages, typically spanning about a year. They will shed skins (or molt) during these growth stages, and

Schutter Diagnostic Insect 119 Plant Bioscience Bldg (mailing) 56 Murch Lab (physical) Bozeman MT 59717 Telephone : (406) 994-5704 Fax : (406) 994-7600	Diagnosed By : Laurre Kerzicnik (laurre.kerzicnik@montana.edu) Completed Date: 3/17/2016
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Sample# 20160043

WHAT TO DO IF YOU FIND A BED BUG

HUD GUIDELINES

- Hospitality businesses are not required to take any measures beyond yearly health department checks
- Health Department should respond to bed bug complaint within 24 hrs
- Complete inspections within 3 days
 - All adjacent units
- Treatment plan
 - Integrated pest management plan (multiple methods)
 - Least toxic methods, not just chemicals

LAWS/LIABILITY

- **No bed bug laws**
- Codes amended and adopted by Administrative Roles of Montana (ARM) Title 24, Ch. 301

IPMC Sec. 309.1 Infestation. All structures shall be kept free from insect and rodent *infestation*. All structures in which insects or rodents are found shall be promptly exterminated by *approved* processes that will not be injurious to human health. After pest elimination, proper precautions shall be taken to prevent reinfestation.

LAWS/LIABILITY

- Montana tenants rights
 - Right #3-70-24-303
 - Law requires the landlord to maintain the rental property

QUESTIONS?

Contact Information:

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