

# Bed Bugs and Deer Mice and Bats! Oh My!

*Pests and Zoonotic Disease Vectors and Reservoirs  
- What schools should know -*

Fall 2011 DOH School Workshops

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## Zoonoses (plural)

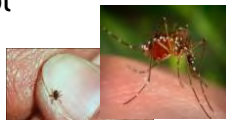
Diseases that can be transmitted  
from animals to humans



Contact



Aerosol



Vector-borne



## Zoonoses - how many are there?

Of approximately 1,415 known human disease causing agents

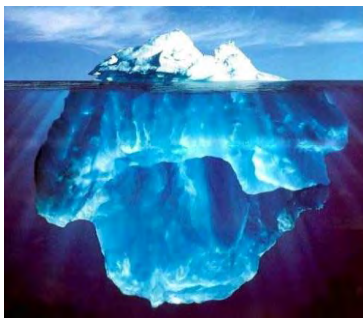
- **868 (61%) ARE ZONOTIC**

Of 175 pathogens defined as “emerging infections”

- **131 (75%) ARE ZONOTIC**

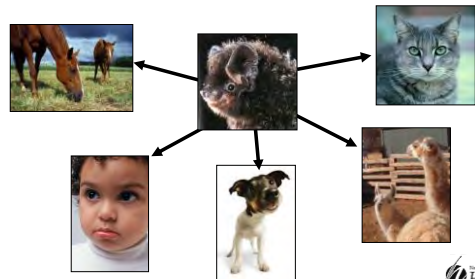


Zoonotic diseases are mostly out of sight . . . and what you don't see . . . CAN Hurt You!!!

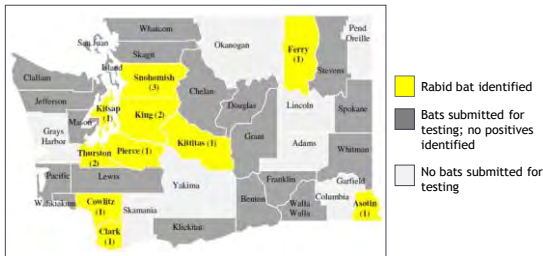


## Rabies in Washington State

Bats are the reservoir for rabies in WA



## Rabies Positive Bats by County 2010



- N = 14 rabid bats during 2010; no other animals tested positive.
- N = 14 rabid bats during 2009; no other animals tested positive.
- Historically, positive bats in nearly all counties.



## Rabies Transmission

- Rabies IS transmitted when the virus is introduced into bite wounds, open cuts in skin, or onto mucous membranes from saliva or other potentially infectious material such as neural tissue
- Rabies is NOT transmitted by contact with blood, urine, feces, petting or touching fur, or being sprayed by a skunk

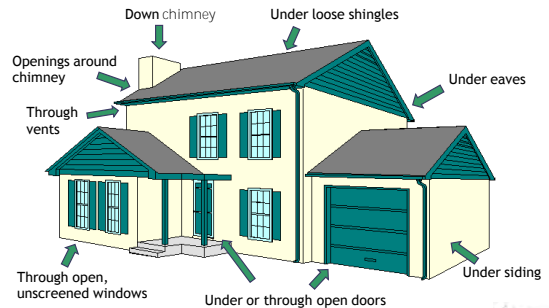


## Bats with rabies

- May appear injured
- May be found flapping or dead on ground
- May fly during the day
- May be found in pets mouth
- Cats are the most commonly affected domestic animal.



## Common Bat Entry Points



### To Capture a Bat:

- When the bat lands, approach it slowly, **while wearing leather gloves**, and place the box or coffee can over it.
- Slide the cardboard under the container to trap the bat inside.

If no one exposed - release bat outside.

### If person was exposed:

- Tape the cardboard to the container securely, and punch small holes in the cardboard, allowing the bat to breathe.
- **Contact your Local Health Dept.** to make arrangements for rabies testing.



## Rabies testing in WA



- Bat must be shipped rapidly and kept cold to prevent deterioration.
- Call local public health
- Test is done in Shoreline at WA Public Health Lab
- 300-500 animals tested annually
  - -50% Domestic / 50% wild



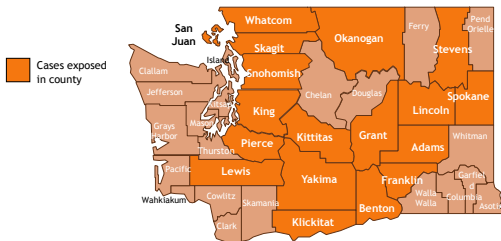
## Hanta Virus Pulmonary Syndrome



## What is a Hantavirus?

- Hantaviruses are a group of viruses carried by rodents
- One of them, *Sin Nombre* virus, is found in deer mice in North America
- *Sin Nombre* virus is the cause of hantavirus pulmonary syndrome in people
- Hantaviruses are rare, but can cause serious life-threatening illness

## Hantavirus Cases by County of Exposure, Washington State 1994-2009



- 1-5 cases/year in WA
- Median age: 36 years (range 14-75 years)



## Hantavirus - Transmission



- Virus inhaled in aerosolized dust
- Can happen when nests, rodents and excrement are disturbed in enclosed areas
- In US (and especially in Washington) the Deer Mouse is only known reservoir host of *Sin Nombre* virus
- Not all deer mice are infected - infected mice only shed virus periodically
- Best to assume all deer mice have it and are currently shedding the virus - **ALWAYS TAKE PRECAUTIONS!**

## Hantavirus Viability



- Depends on environmental conditions
  - Temp, humidity, indoors/outdoors, exposure to sun, rodent's diet (affects urine chemistry)
- Normal room temperature: 2-3 days
  - Sunlight decreases viability
  - Freezing temps can increase virus viability
- Active rodent infestations, in often enclosed areas, are what leads to human infections



## Deer Mouse (*Peromyscus maniculatus*)



Top of tail has dark strip of hair

Large bulging eyes

White underbelly and throat

## Prevention

- Deter rodents from colonizing in and around homes and workplaces
- Safe cleanup of rodent waste and nesting materials
- Use proper control methods

**Seal Up!  
Trap Up!  
Clean Up!**



## Clean Up

**DO NOT SWEEP, DUST or VACUUM!**

1 part  
bleach  
+  
9 parts  
water



1. Wear protective equipment (coveralls, rubber boots, gloves, goggles, appropriate respiratory protection)
2. Air out the contaminated area
3. Don't stir-up and breath dust
4. Spray droppings, dead mouse, nesting material with disinfectant or bleach-water mixture; let soak
5. Wipe up with paper towels or mop up
6. Dispose of waste & dead animals in plastic bag
7. Mop or sponge the area
8. Wash gloved hands before disposing
9. Decontaminate or dispose of protective coverings
10. Wash hands, shower



## Disposal of Rodent Contaminated Supplies and Equipment

- Put on protective clothing and equipment
- Spray contamination with disinfectant
- Wait 30 - 60 minutes
- Place sprayed decontaminated material in a plastic bag - seal the bag
- Place the bag in a dumpster



## Harder to Clean Items

Follow basic procedures as discussed and for contaminated items:

- Carpets, rugs, upholstered furniture
  - Steam clean with disinfectant, hot water
- Clothes, bedding
  - Wash in hot water and detergent, dryer heat high
- Books, paper, and other things that can't get wet
  - Expose to sunlight or isolate in non-infested areas to allow virus to "die out"



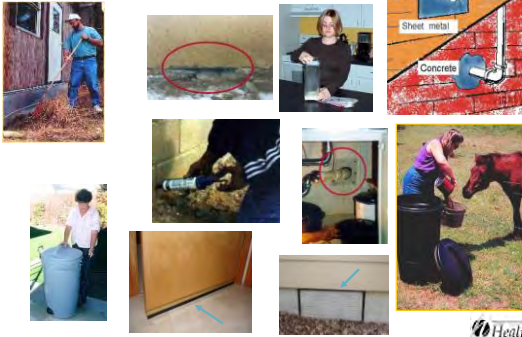
## How They Get In



1/4" x 1/2"



## Prevention - Deterrence



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## Controlling Mice - Outside

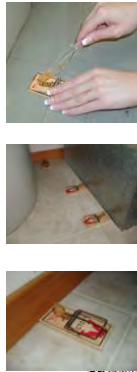
- Encourage natural predators
  - Non-poisonous snakes
  - Owls
  - Hawks



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## Prevention - Control

- Mouse snap traps - read instructions
- Use chunky peanut butter (mixed with oats) as bait
- Place traps where you have mice evidence
- Put end of trap against wall to form "T"
- Concentrate traps
- Keep away from pets & children
- Keep track of placement, check regularly
- Clean up and dispose of trapped rodents properly



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## Prevention - Control

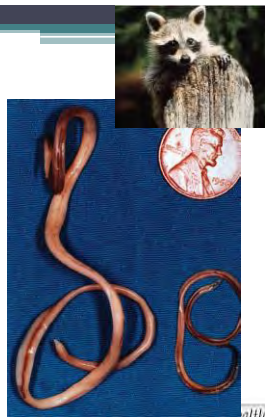
- Poison baits can be useful for serious infestations
  - Follow instructions
  - Keep out of reach of pets & children
  - Check often and refill as needed
  - Acknowledge problems they can cause
- Glue traps and live traps are not recommended
  - Mice get scared, urinate, move around, potentially stirring virus into the air



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## Baylisascariasis

- *Baylisascaris procyonis* (bay-liss-AS-kuh-ris pro-sigh-OH-nis)
- Raccoon roundworm
- Causes larva migrans in humans & animals
- Adult worms infest the intestines of raccoons and dogs



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## Raccoon Latrines



## Raccoon Roundworm - Clean Up

- Remove feces & contaminated material - burn, bury, or send to landfill
- Avoid getting feces on hands and clothes
- Use PPE
- Wash hands immediately afterward with soap & water.



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## Raccoon Roundworm - Prevention



- Discourage contact with raccoons
- Do not leave food out for raccoons
- Keep food in coon-proof containers
- Cover sand boxes when not in use
- Clean up brush around property

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## Psittacosis



- Common in parrots, parakeets, pigeons, doves
- Humans infected from inhaling contaminated dust from feathers or bird droppings
- Incubation period: 1-4 weeks
- Disease varies from flu-like illness to more serious pneumonia-like illness



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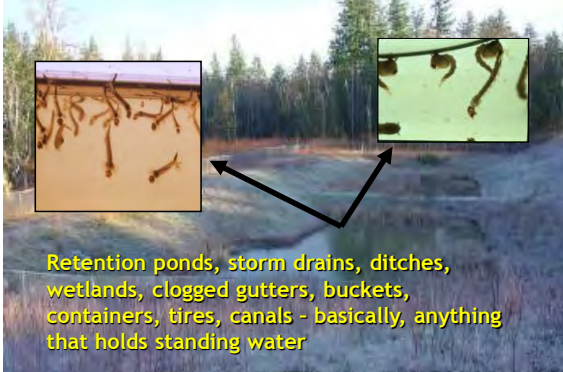
## Mosquitoes

- Transmit diseases
  - West Nile virus
  - St. Louis Encephalitis
  - Western Equine Encephalitis
- Itchy bites
- Annoying



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## Do you have potential mosquito habitat?



## Take responsibility



### For lined or contained water bodies:

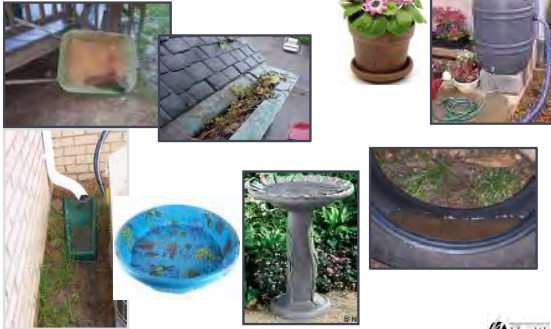
- Remove or circulate the water (fountain)
- Add mosquito fish
- Treat using mosquito “dunks” or “bits” from home and garden stores that contain a larvicide (*Bacillus thuringiensis israelensis* (Bti)); follow the label directions

### For uncontained water bodies that can reach other water bodies (retention pond with outlet, ditches, pond with stream, etc.):

- Licensed pesticide applicator needed to apply larvicides and you may need an NPDES permit

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## Eliminate Standing Water



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## Mosquito Repellent - Know how to use it Safely



- 15% DEET for children max
- 30% DEET for adults max
- Select a repellent that offers the best protection for the time you will be outdoors

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## Ticks



- Blood-feeding parasites.
- Most tick species wait on low-lying vegetation for an animal to brush against them
- Attach by burrowing their mouthparts into the skin for a blood meal.
- Feed anywhere from 2-10 days
- Transmit
  - Rocky Mountain Spotted Fever
  - Lyme Disease
  - Cause tick paralysis
  - Relapsing Fever (transmitted by soft ticks - feed only 30-90 minutes at night)

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## Ticks



### Avoid getting bitten

- Wear long pants and a long-sleeved shirt. Tuck your pant legs into socks or boots and shirt into pants.
- Use tick repellent when necessary, and carefully follow instructions on the label.
- Buddy Checks - Check yourself, your children and pets thoroughly for ticks. Carefully inspect areas around the head, neck and ears. Look for what may appear like a new freckle or speck of dirt.

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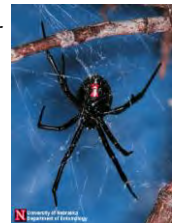
## Spiders

Western Black Widow  
False Black Widow  
Hobo Spider  
Yellow Sac Spider



## Western Black Widow

- Found in woodpiles, wall crevices, crawl spaces, exterior gas & water meters
- Nonaggressive
- Symptoms occur 30 min-few hours of bite
- Local bite site care - thorough cleansing, ice pack, then go see doctor



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## False Black Widow

- Found in houses and garages
- Shaped like Black Widow; glossy black with NO red hour-glass shape on abdomen
- Bites - pain and systemic effects similar to, but milder than black widow bites
- Distribution worldwide



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## Hobo Spider

- Commonly encountered in homes from mid-August until November.
- Builds flat webs of non-sticky silk with a tunnel - made in shrubbery, basement window wells & crawl spaces, wood piles, and voids under concrete.
- Implicated in cases of necrotic arachnidism in Pacific Northwest



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## Yellow Sac

- Commonly found in eastern WA
- Nocturnal
- Common in gardens
- Inside, often found along walls, esp. wall-ceiling junction
- Can be aggressive and bite with little provocation
- Bite is painful, similar to a bee sting



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## Spider Control Strategies

- Use gloves and clothing that covers skin when working in crawl spaces and similar locations, retrieving firewood, etc.
- Screen basement and ground-floor windows
- Install insulation strips under doors
- Spiders are beneficial - Carefully trap spiders and release outdoors far from buildings.

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## Wasps and Hornets

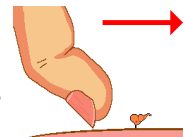
- Beneficial insects - eat insects that damage shade trees and crops and house flies
- Nests can be in trees, on buildings or underground, depending on species
- Attracted to food at picnics or in garbage cans



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## Bees

- Honey bees, Bumble bees, Orchard Mason bees
- Non-aggressive if left alone
  - **Critically** important pollinators for food crops
- Attracted to sweet liquids
  - e.g. regular Coke or Pepsi
- If stung by a honey bee, scrape stinger out of sting site.



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## Stinging Insects - Bees, Wasps, Hornets



- Avoid fast movements if they're in the vicinity
- Don't wear strong smelling cologne or perfume to work
- Avoid wearing brightly colored clothing (esp. yellow, orange and red)
- Wear white, green or bright brown
- No teasing the girls . . .



## Wasps and Hornets



- Aerial nests can be sprayed with aerosol
- Underground nests - use registered hornet & wasp spray; Direct spray into hole after dark
- In wall voids - call a professional



## Wasps and Hornets



### Safety Precautions

- Cover yourself with thick clothing
  - head, face, neck, hands
- Wear glasses to protect eyes
- Spray or remove aerial nests during the coolest part of evening; on a cool day if possible
- Carefully put pesticide into the entrance hole of ground nests after dark (they may be attracted to the light of your flashlight)



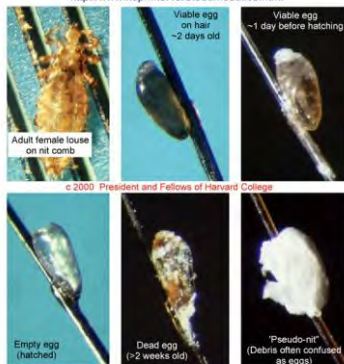
## Head Lice



- Small parasitic insects adapted to living mainly on the scalp and neck hairs of their human host.
- Do not respect socio-economic class distinctions.
- Presence does not connote a lack of hygiene or sanitation.
- Mainly acquired by direct head-to-head contact with an infested person's hair, but may infrequently be transferred with shared combs, hats and other hair accessories.



Images to assist in the identification of head lice and their eggs.  
<http://www.hsph.harvard.edu/headlice.html>



## Head Lice - Control & Prevention

Once a head lice infestation is confirmed:

1. Treat with an approved lice control treatment, carefully following treatment directions
2. After treatment, comb the hair with an effective, metal, lice removal comb to remove the nits.
3. Get rid of eggs in the sink, toilet, or garbage. Vacuum around the area where you were combing out eggs. Both people should change their clothes afterwards.
4. Comb, using the lice comb daily for seven days, and until you no longer find any lice or eggs.
5. Most products recommend retreating after 7-10 days. Repeat above steps.



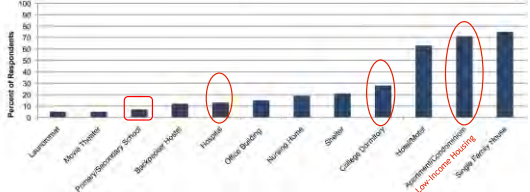


**Bed Bugs**

Images showing a bed bug, a bite on a person's arm, and several pale, oval eggs.




### Most Vulnerable Industries (global)



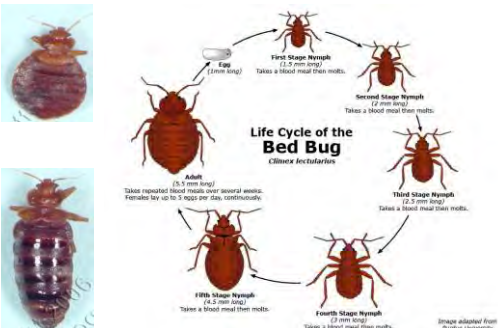
NPMA Bed Bug Survey Results

**\*\* Jack Marlowe**  
Eden Advanced Pest Technologies




### Life Cycle of the Bed Bug

*Cimex lectularius*



Images of bed bugs at various stages of their life cycle.



### Why are bed bugs making a comeback?




Images illustrating factors contributing to the resurgence of bed bugs: a suitcase, a sign about DDT, and bed bugs on a backpack.




### Pesticide Issues

- Nationwide, pesticide illness data suggest bed bug-related pesticide overexposure increasing
- Nationwide effort to coordinate and document cases related to bed bugs
- Combination treatment approaches
- Insecticide Resistance



### Are Bed Bugs A Public Health Issue?

- ▶ Found naturally infected w/  $\geq 28$  human pathogens
  - ▶ Never proven to transmit any human disease
- ▶ Allergic reaction to bites (mild to severe)
- ▶ Secondary skin infections from scratching bites
- ▶ Mental Health issues
  - ▶ Anxiety, insomnia, systemic reactions
  - ▶ Serious social stigma to "having" an infestation





8 days post-bite



14 days post-bite



1 month post-bite

**Washington State Department of Health**  
Division of Environmental Health  
Office of Environmental Health, Safety, and Toxicology

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**Bed Bugs** [Print this page \(PDF 473K\)](#)

**What are bed bugs?**  
Bed bugs are small, flat insects that feed on our blood, typically at night, while we are sleeping. Adult bed bugs are about 1/4 of an inch long, have flat, rusty-red-colored oval bodies, and look like an apple seed. They feed for about 3-10 minutes and their bodies swell and become bright red. During the [bed bug life cycle](#), a female can lay 200-400 eggs depending on food supply and temperature. Bed bugs don't fly, but can quickly walk across floors, walls, and other surfaces.

**Can I get a disease from bed bugs?**  
No, there are no known cases of infectious disease transmitted by bed bug bites. However, some people are more sensitive to the bites and develop itchy, red welts. Scratching the bites can lead to infection. Bed bugs may also affect a person's mental health. Anxiety, insomnia, and irritability have been reported in some people.

**How do I prevent bed bugs from entering my home?**  
People often bring bed bugs into their homes via infested luggage, furniture, bedding, or clothing. Bed bugs can hitch a ride on items purchased second-hand, or from friends and bedding that is delivered to your home. Bed bugs may also travel between

**Signs of Bed Bugs**  
Red, itchy bites on skin noticed after sleeping.  
Small, rusty-red and black spots on mattress, pillows, and bed linen.  
Sweet, musty odor.

**If You Find Bed Bugs**  
Treatments - Notify your landlord immediately.  
Landlords - Hire a licensed and

**Access Washington**  
www.access.wa.gov

## PREVENTION - Recommendations

- Always wear personal protective gear when dealing with potential exposure situations
- Moisten contaminated environment before cleaning- avoid making dust!
- **Skin/body Protection** (bites, scratches, other contacts)
  - Gloves and other protective clothing (barrier protection)
  - Practice good personal hygiene (frequently wash your hands correctly)



## PREVENTION - Recommendations

- **Respiratory Protection**
  - Wear appropriate face protection (cover mouth and nose)
  - Ventilate contaminated area (for at least a half an hour)
  - Moisten contaminated materials, excrement, and carcasses - prior to wiping or scooping up
- **Mucous Membrane Protection** (eyes, mouth, nose)
  - Wear appropriate face covering (mask)
  - Wear appropriate eye covering (goggles, safety glasses)
  - Do not smoke, eat, or touch eyes, nose or mouth while handling equipment and contaminated items





Thank You!

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[www.doh.wa.gov/ehp/ts/zoo.htm](http://www.doh.wa.gov/ehp/ts/zoo.htm)

