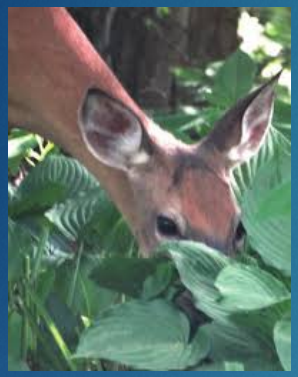
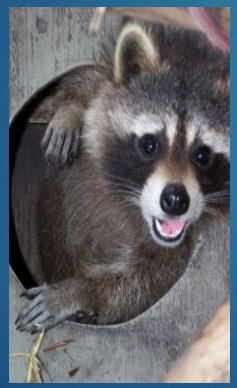
Enhancing Your School IPM Program
Pest Specific Strategies




Dr. Marcia Anderson
Mr. Colin Walsh

Center for IPM
epa.gov/managing-pests-schools
school.ipm@epa.gov


Maine
RSU#57

There is nothing *ordinary* about any school ...

Nor are any two *alike*

Reasons for Poor Pest Management

- Poor housekeeping
- Unmonitored food (breakfast) in the classrooms
- Bid specifications weak
- Lack of interested or low prioritization of pest management issues
- Little to no oversight of pest contracts
- Limited custodial/maintenance staff at schools
- Improper use of pesticides / rodenticides (lack of understanding)
- Limited understanding / application of IPM methods

Tick Safe Schools Using IPM

Tick Prevention: Remove leaf litter

- Remove leaf litter, brush, and weeds at the edge of the lawn.
- Study Results: Removal of leaf litter in spring and summer (March + June) resulted in reductions in nymph tick density ranging from 73% to 100%.

Tick Prevention: Keep grass mowed

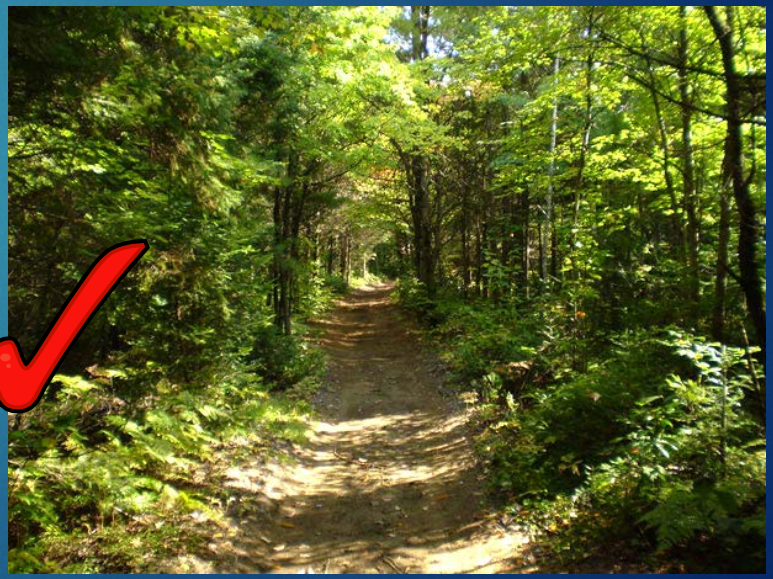
- Keep grass mowed on all school grounds including sports fields

Ticks: Create a buffer zone

- Create a nine foot (9') buffer zone between wooded and un-mowed vegetation on all school grounds

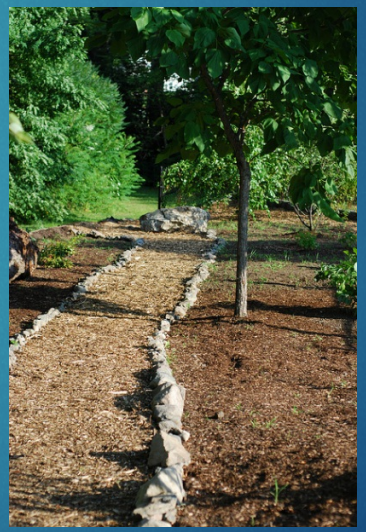
Clear ground cover around walls, playgrounds, etc.

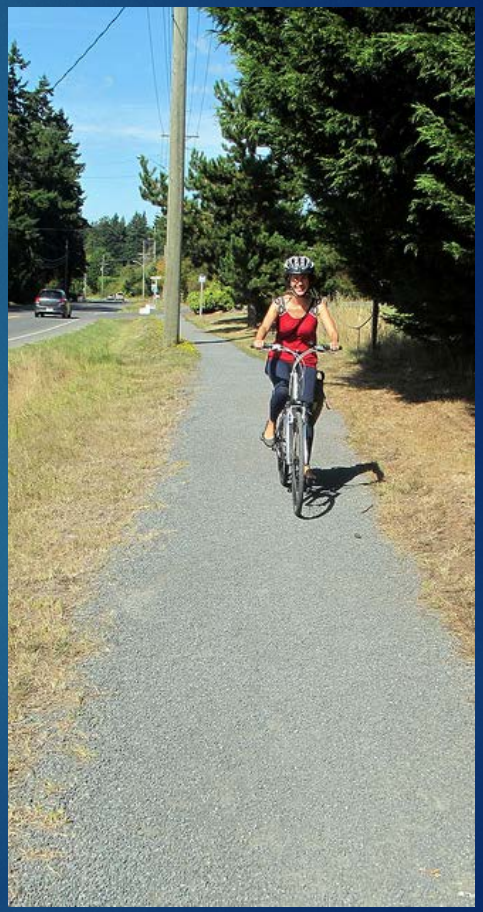
- Clear ground cover and vegetation around stonewalls, wood piles, and play equipment.
- Trim tree branches and shrubs around lawn edge.
- Clear woodland trails.



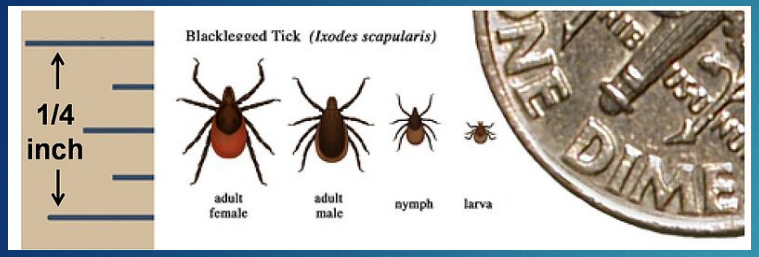
Adopt hardscape landscaping techniques

- Adopt landscaping techniques with gravel pathways and mulches
- Create a 3-foot or wider wood chip, mulch, or gravel pathway



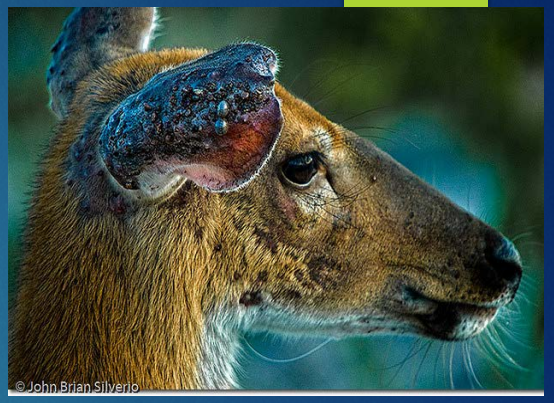


Monitor & Identify Ticks – Keep Records



Tick Prevention: Exclude deer

- Deer are hungriest in Spring
- Deer are primary hosts of ticks
- Deer tick station in areas with heavy deer populations



Mouse-Targeted Tick Control Devices

Tickboxtcs.com

Tickencounter.org

Tick Prevention: Exclude Deer with Fencing

- Exclude deer to control ticks
- 8- 10’ fencing is most effective
- Tall, deer-resistant shrubs near fence
- Irregular fence top
- Double fence
- Angled fence
- Exclusion wire atop 8’ fence
- Slanted, 7-wire fence
- Fishing line

Habitat Modification

- Reduce moisture to reduce tick habitat
- Keep grass mowed
- Remove leaf litter at lawn edge
- Keep playground equipment away from woodland edges
- Trim trees and brush allowing sunlight to penetrate
- Trim trees and shrubs at woodland edges to for less deer browsing
- Create 3’ wood chip or gravel border between turf and woods

Non-Chemical Deterrents

- Sewage fertilizer or mulch product
- Aluminum pie pans
- Flashing lights
- Motion activated lights
- Motion activated sprinklers
- Human hair in stockings
- Irish Spring soap

Avoid / Remove these plants

Honeysuckle

Barberry

Select the Strategies Best for Your School

- Personal protection
- Landscape modifications
- Restrict human traffic
- Deer fencing
- Pesticide 'barrier'
- Tick-control rodent stations
- Post-outdoor tick checks

Install Deer Fencing

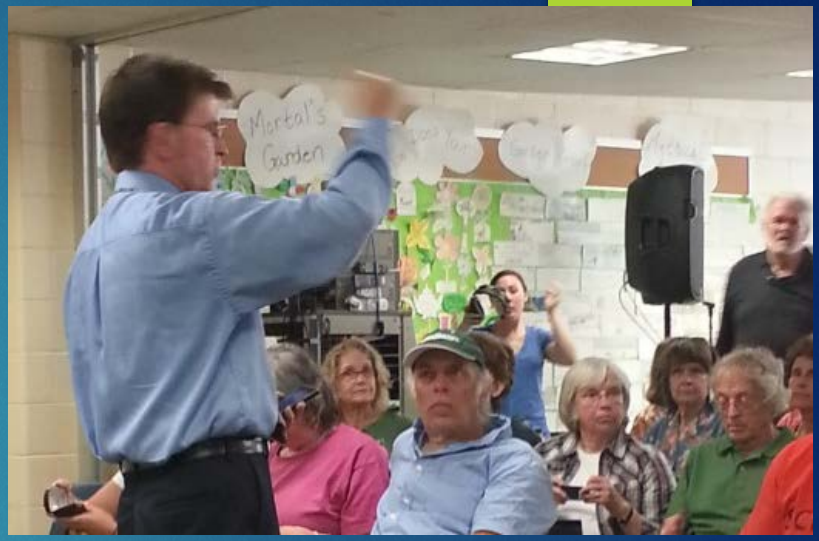
Create Tick-Safe Zones

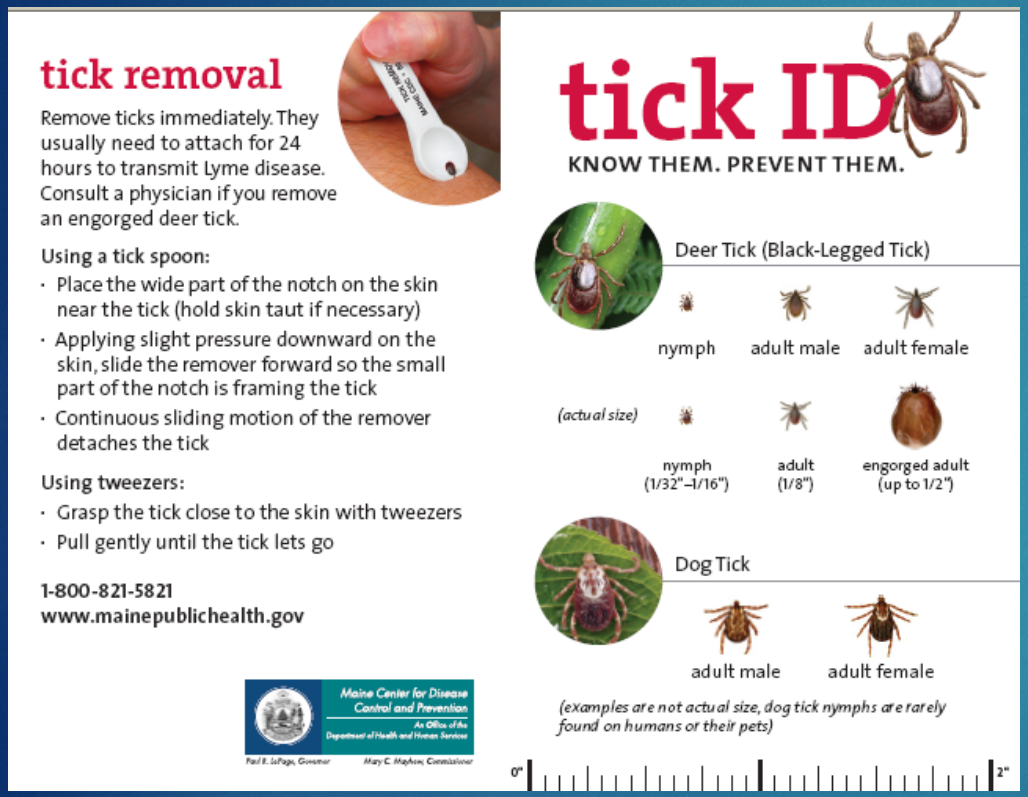
Widen Trails

Tick Management Handbook, K. Stafford, 2004

Maine.gov

Community Tick Education & Resources





tick removal

Remove ticks immediately. They usually need to attach for 24 hours to transmit Lyme disease. Consult a physician if you remove an engorged deer tick.

Using a tick spoon:

- Place the wide part of the notch on the skin near the tick (hold skin taut if necessary)
- Applying slight pressure downward on the skin, slide the remover forward so the small part of the notch is framing the tick
- Continuous sliding motion of the remover detaches the tick

Using tweezers:

- Grasp the tick close to the skin with tweezers
- Pull gently until the tick lets go

1-800-821-5821
www.mainepublichealth.gov

Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
Paul R. LePage, Governor — Mary C. Mayhew, Commissioner

tick ID

KNOW THEM. PREVENT THEM.

Deer Tick (Black-Legged Tick)

nymph | adult male | adult female

(actual size)

nymph (1/32"–1/16") | adult (1/8") | engorged adult (up to 1/2")

Dog Tick

adult male | adult female

(examples are not actual size, dog tick nymphs are rarely found on humans or their pets)

http://www.cdc.gov/ticks/

Maine.gov

What are your pest thresholds?

- At what point does a school administrator determine if there is a real pest problem?
- When is it time to call a pest control company?
  - 1 ant found?
  - 5 ants found?
  - 20 ants found?

How to Keep Ants Out

- Follow the ant trail….
- Caulk cracks around the foundation including wire and pipe entrances
- Keep plants and mulch away from foundations
- Remove garbage from buildings each day
- Change trash can liners when dirty

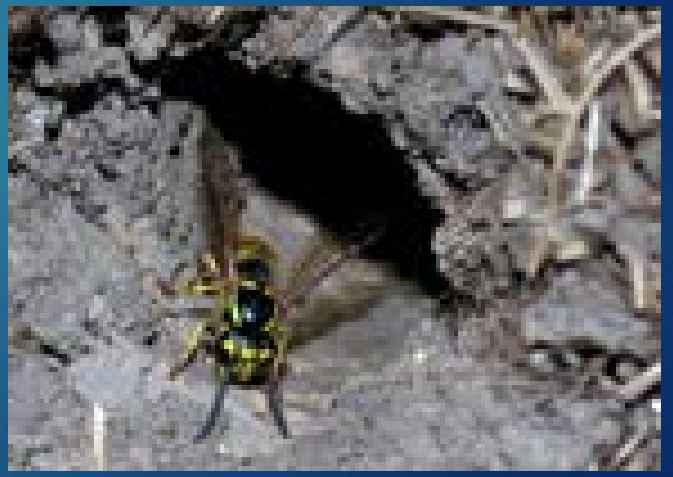
Traps & Baits

- Key pest management tools
- Baits contain slow acting poisons mixed with an attractant
- The bait is carried back to the nest
- Place stations only where children do not have access to them

Yellow Jackets and Wasps

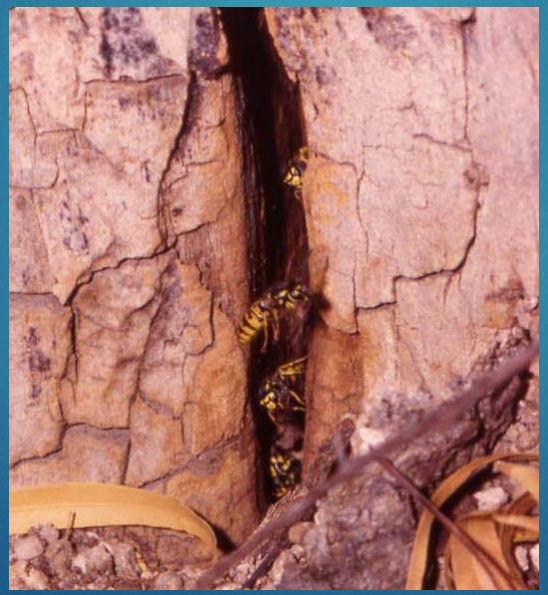
Yellow jackets

- Yellow jackets are NOT bees
- Most active from August through October
- Large colonies up to about 3000 wasps
- Nests - in ground or attached to buildings
- Will sting if nests are disturbed
- Stings are a major source of sting allergy
- Colonies die in winter
- Elimination - by trained professionals



Yellow jacket and wasp nests

Some “Natural” locations may not require treatment



baldfaced hornet & nest

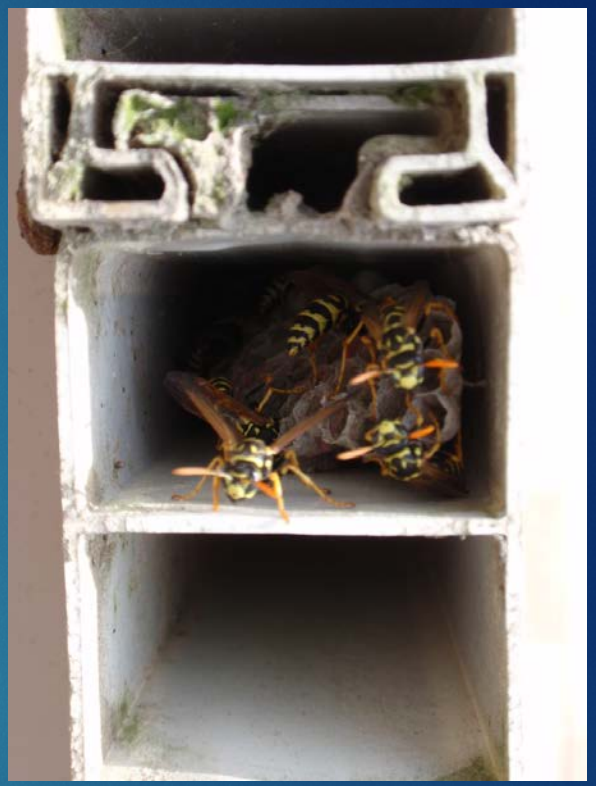
Yellow jacket nest in structural voids

- Nests in hollow voids of foundation, wall, roof, and may be inaccessible
- Insecticide/pyrethroid dusts work well for voids, tracked into nest
- Never treat void from outside if risk of causing an indoor infestation
- Seal the entry once activity has ceased
- Vacuuming can buy some time if needed

Eaves are a common nesting spot

Other Nesting locations

- Find potential nesting sites before they nest
- Any hollow object may be used



Most gaps we “provide” for paper wasp nesting (like hollow lettering on schools) some are unintentional(like the end of railings or support rods that are hollow)

Mark Hardin Photos

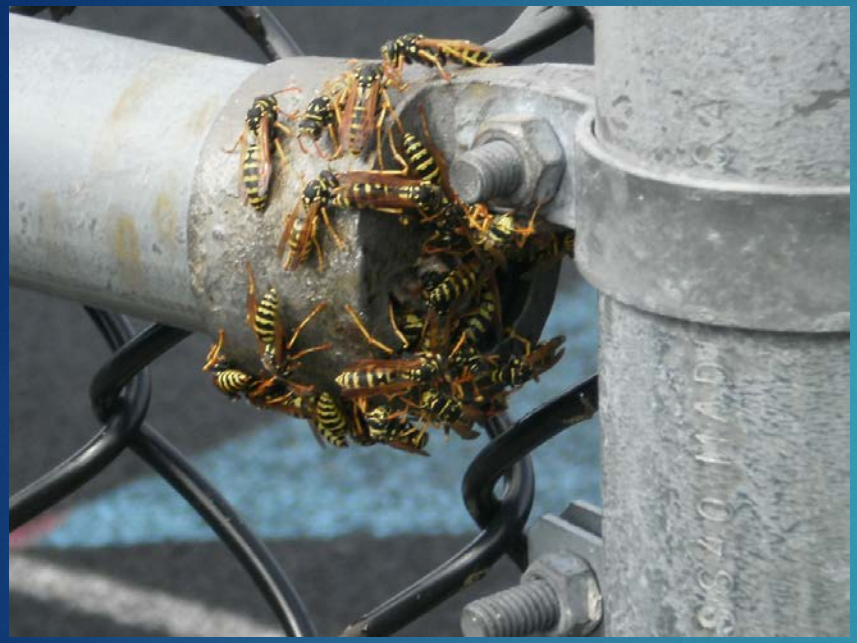
Even More School Nesting Locations

Mark Hardin Photos

More School Nesting Locations

Mark Hardin Photos

Chain link fences



Mark Hardin Photos

Vacuuming exposed & void nests

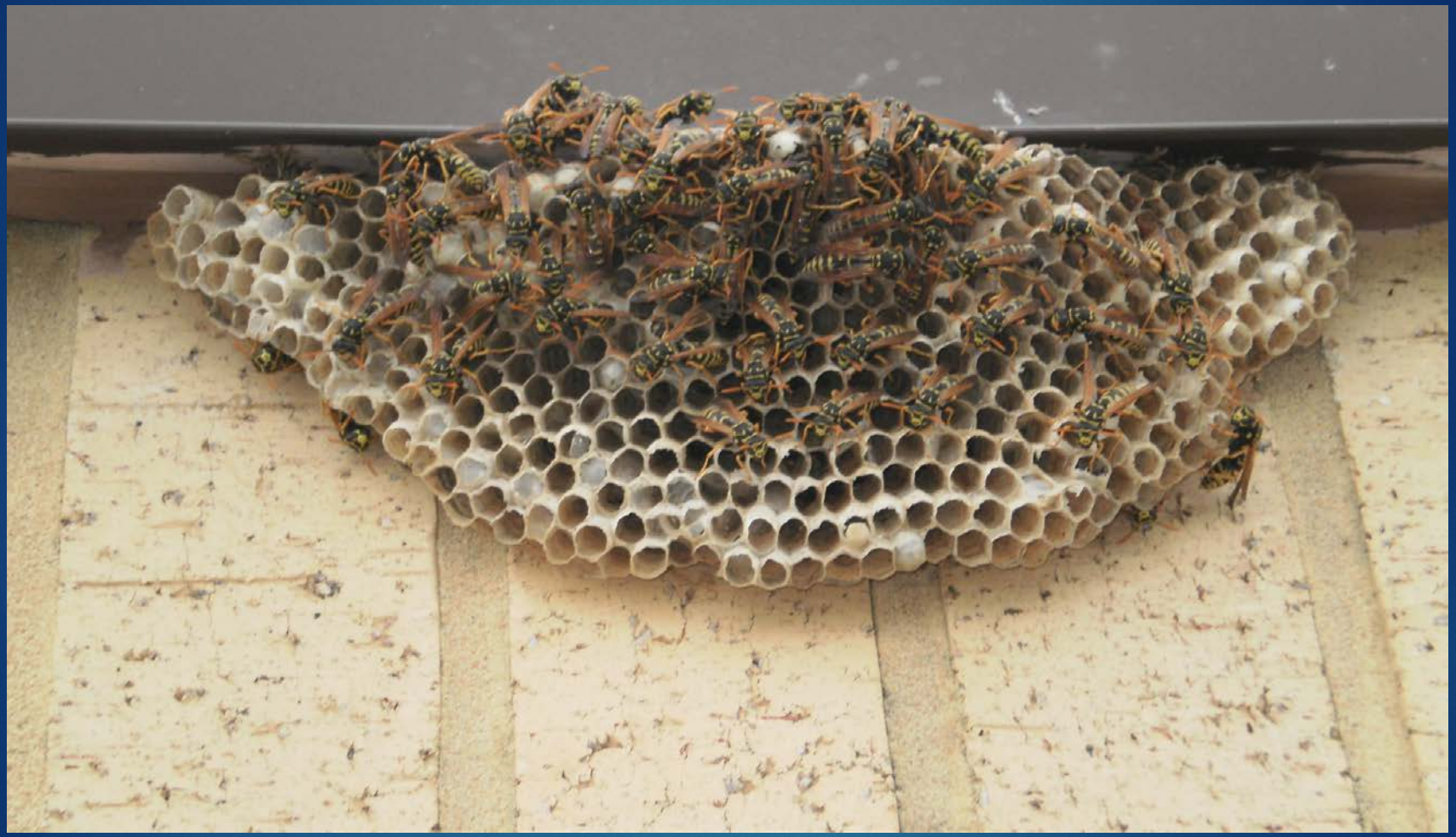
Building Maintenance

- Seal voids
- Reduce attractants

Paper wasps

- Most active in summer
- Overwintering adults can be seen in houses on warm winter days
- Will sting if nests are disturbed
- Stings are a minor source of sting allergy
- Nests are abandoned in winter
- Nest destruction with water jet / hose

Risks for paper wasps is not as great as for hornets (including yellow jackets)



Mark Hardin Photo

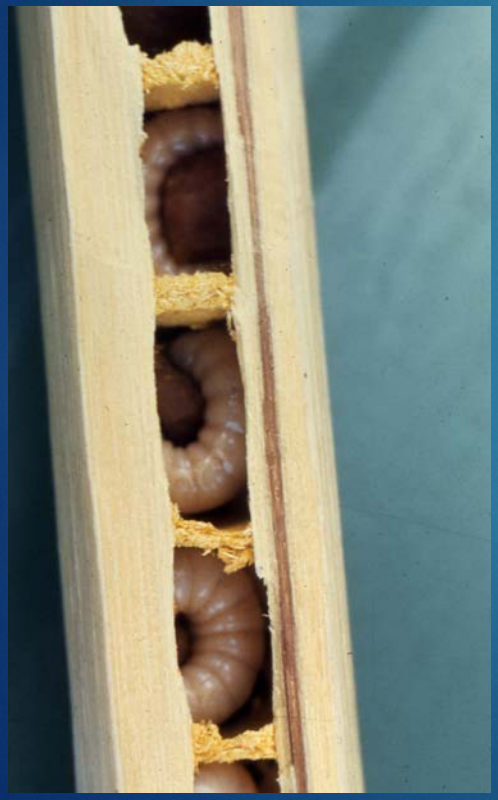
Paper Wasp nest location

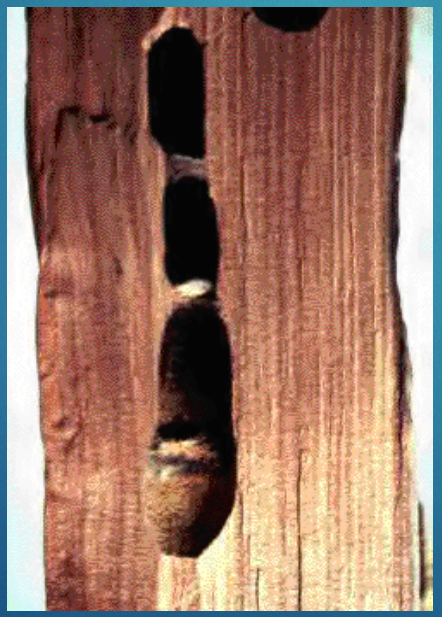
If paper wasp nests are knocked down once every 2 weeks during May – July, nest building is greatly diminished

Use a high pressure hose end for high up nests

Carpenter Bees

- Large harmless bees.
- Very beneficial by pollinators.
- They do not sting!!
- Plug entrance holes and painting discourage nesting.

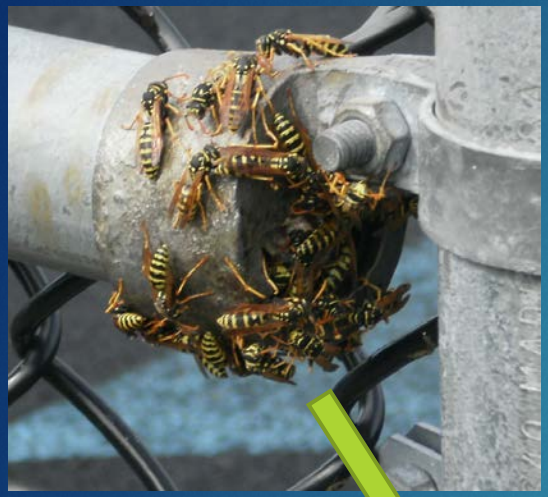




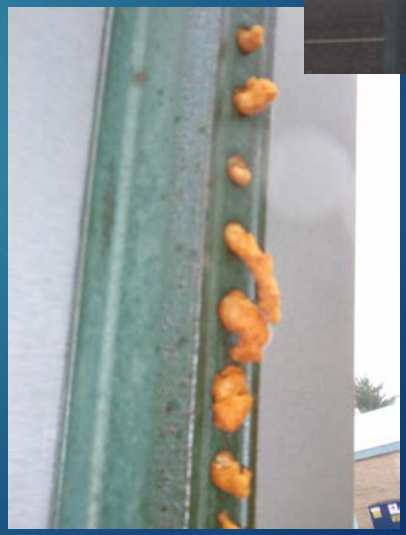
Life stages of a native paper wasp

- The larvae may remain in a nest if you kill the adults and do not remove and destroy the nest and will then be a threat when they mature and emerge

Materials for sealing nest entrances



Sealing wasps out of other posts



Mark Hardin Photos

Jar traps have limited uses

Collecting stragglers
Or in specific locations like trash dumpsters

Mark Hardin Photos

Tips for trapping yellow jackets

- Target late season foraging for sweets
- Cheap fruit punch, orange soda are excellent baits
- Vaseline around inside rim of bait jars
- Keep traps at about 6 ft height
- Traps best located in sunny sites
- Reduce access to alternative food so beginning trapping

Research Conclusions

- Best use: If there already exists a strong attractant (concession stands)
- Not recommended if no food attractant exists (school playgrounds)
- Distance from “protected” area probably important
- Festivals: start trapping one week before
- Traps need to be regularly serviced

Bed Bugs In School Environments

Center of Expertise for School IPM

Bed Bugs go to School

Two NJ schools are sprayed with pesticides due to the sighting of one bed bug. No timely notice was given to parents. Oct. 11, 2011

"Kentucky school bans backpacks and lunch boxes after bedbugs appear…" - Sept. 7, 2010

"Bedbugs are invading classrooms at alarming rate" ("It was, like, 'OMG, there's bedbugs in the school,'")-NYC, NY - Nov. 5, 2010

"Bedbugs are sighted at a Jersey City School and officials stated they will confine them to the 3rd floor and not close the school despite outside pressure" -Dec. 20, 2010

Suspected bedbug causes closure of CCAC campus in McCandless

Thursday, October 28, 2010
Pittsburgh Post-Gazette

A student who showed up for class with what is believed to be a bedbug on his clothing prompted the closure of Community College of Allegheny County's North Campus in McCandless, sending 3,500 students as well as employees home for the rest of the week.

The decision to cancel classes until Monday was made "as a precaution." The unidentified student, whose apartment is being treated for the pest, entered the building Wednesday morning and the bug was spotted, CCAC spokesman David Hoovler said.

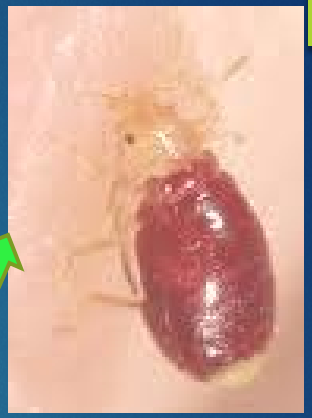
"He left campus and agreed not to return until his apartment is taken care of," Mr. Hoovler said.

Exterminators inspected the building Wednesday afternoon before the decision was made to cancel classes for the rest of the week.

Can you identify the bed bug?

1 Tick

2 Tick

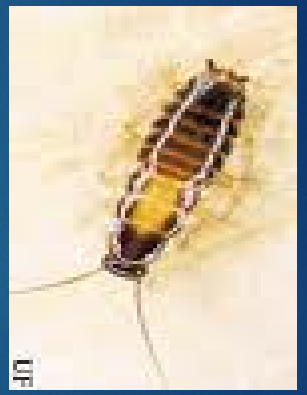


3 Bed Bug nymph

4 Carpet Beetle

5 Cockroach

6 Adult Bed bug



7 Cockroach nymph

Physical ID

- Oval Bodied, < ¼ inch.
- Adults: brown to red in color
- Wingless – they do not jump
- Six legs
- Nymphs are nearly colorless
  - Size of a poppy seed
- Eggs are white, 1-2mm
- Eggs glued to rough surfaces

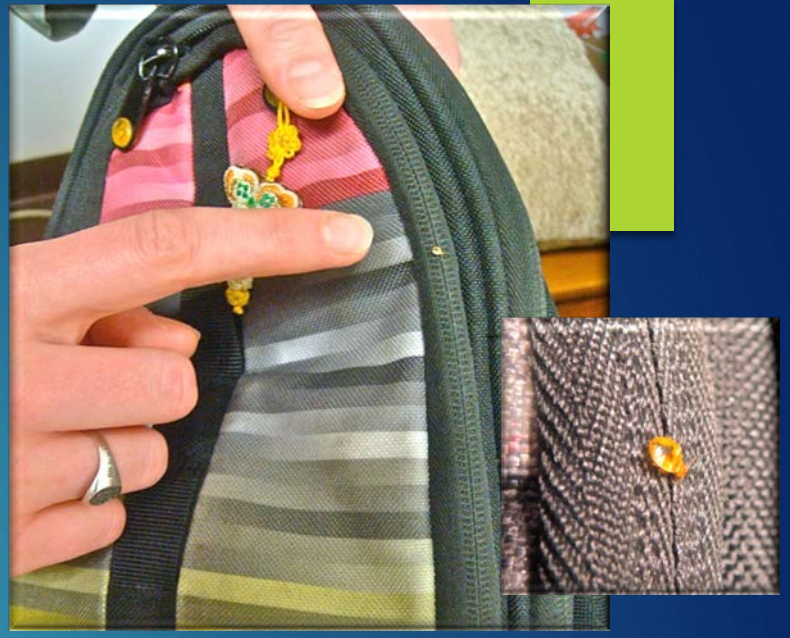
Don’t Let Panic Influence You!

- Bugs are reported
- In many instances, the problem wasn’t confirmed
- Classrooms vacated
- All contents fumigated
- Entire school treated
- Extremely concerned parents

Not a Sustainable Approach!

Introduction Versus Infestation

- Introduction- a single bug or a group of bugs that are not breeding
  - A single or multiple immature bugs
  - A single or multiple male bugs
- Infestation- a reproducing population
  - Can be a single mated adult female
  - Eggs present



Introduction- on a student backpack

Infestation- In the Classroom

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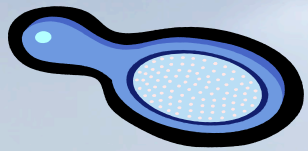
Classroom Infestations

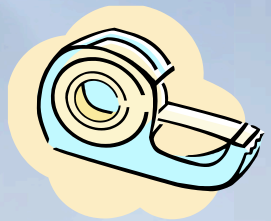
- Decide how to respond to a bed bug incident in a classroom.
- 1 bed bug is not an infestation.
- Breeding infestations in a school are rare.
- An infested classroom will require professional treatment and parent notification.
- (State laws often require parent notification of **any** pest infestation

Inspecting for Bed Bugs



Identify the presence of multiple bed bugs

- Magnifying glass
- Strong flashlight
- Plastic zip-bags, lint roller or scotch tape
- Mirror



Inspection (Human or Dog)

- Humans will take several hours (time is money)
- Dogs are excellent detectors: schools and school busses.
- Inspect at regular intervals.
- Dogs signal only on live bugs!!
- Never pay for a treatment if the handler cannot show you a live bug.
- Be present for the inspection.
- No light hits!!!!

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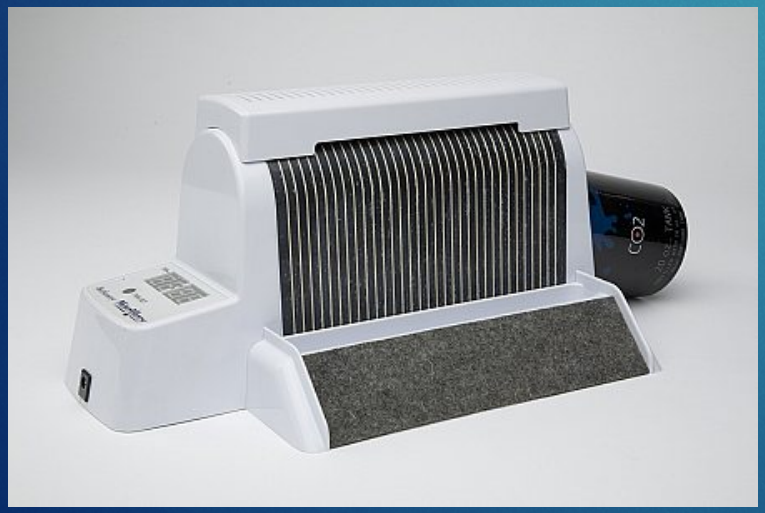
Visual inspections are highly unreliable when it comes to detecting low level infestations!

Just Because You Don't Find Them Doesn't Mean They Aren't There!

Evaluate!


CO2


WARNING
AVISO
TIDY CATS


SenSci
Activ
Bed Bug Lure
ATTRACT MORE BED BUGS
• Use with most detection devices
• Easy to use
• Lure developed by Rutgers University
SenSci
Activ
SenSci Activ Bed Bug Lure
Read and follow all label directions for this product.
Do not remove contents from packet.
SenSci Activ™ Bed Bug Lure is an attractant designed to increase the probability that a bed bug monitor detects the presence of bed bugs.
Directions: Wearing gloves, slowly tear open packet along "tear line".
DO NOT remove the towelette from the packet. Place the open packet in a monitor labeled for bed bugs, like the SenSci Volcano Bed Bug Detector. Place monitor and packet on a flat surface where bed bugs are suspected to hide or travel. Common areas to include: on floor next to legs of bed, behind headboards and other associated sleeping areas. Bed bugs may take 24 hours or more to respond to the lure. Inspect the monitor(s) periodically.
CAUTION: Keep out of reach of children and pets
See back panel for additional precautionary statements
Net Contents: 1 towelette (0.8 ml)

Passive Monitors

- Before and after treatment
- Used for detecting small infestations
- Used to determine the success of a treatment
- Used as a method of early detection
- So far no active monitor has performed significantly better than the passive monitors
- Also use post-treatment
- Do not work if no one checks them!

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Bed Bugs on Students (Introduction)

- Purchase a household dryer with a shelf.
- Have a change of clothing for the student.
- Put belongings in the dryer.
- 30 minutes on high heat.
- Your problem solved for the moment….

Thermal death point for adult and nymphs – 118°F
Thermal death point for eggs – 122°F

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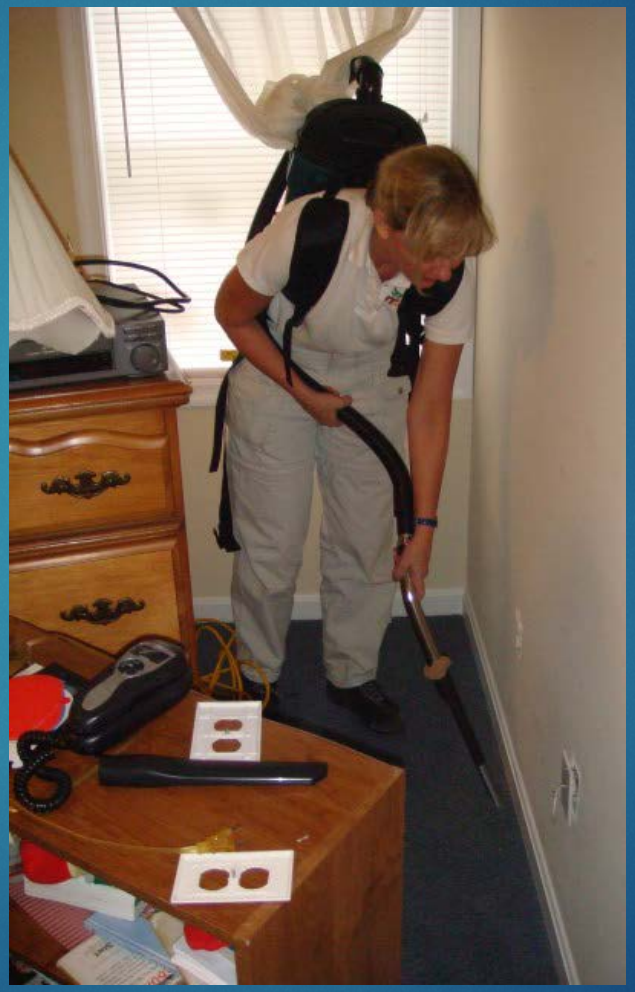
Vacuums can be used to quickly eliminate large numbers of bugs

Vacuuming!

- Immature bed bugs often hide in the shed skins of their older sibilings
- Vacuum the floor, furniture, and perimeter,
- Remove bed bug exuvia!!!



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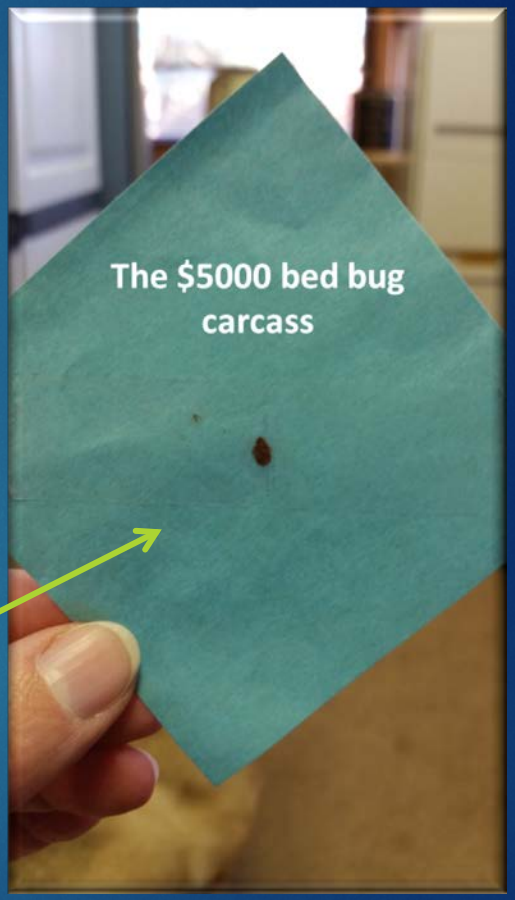
What type of vacuum?

- Commonly recommend bags
- HEPA filters can be difficult to clean
- Bugs can live in vacuums
- Strong suction ability
- Easy to use and light

Select An Experienced Pest Control Company (or Else!)

- Start interviewing companies before you have bed bugs.
  - References, protocols, and product names
  - Ask about follow-up inspections
- Do not expect that your current company has experience in bed bugs. Ask!
- If you call in hysterics (Now! Now! Now!) you will pay a premium price.
- Assignment: Have two companies identified by the end of January 2015
- Time is money!



The price of panic!

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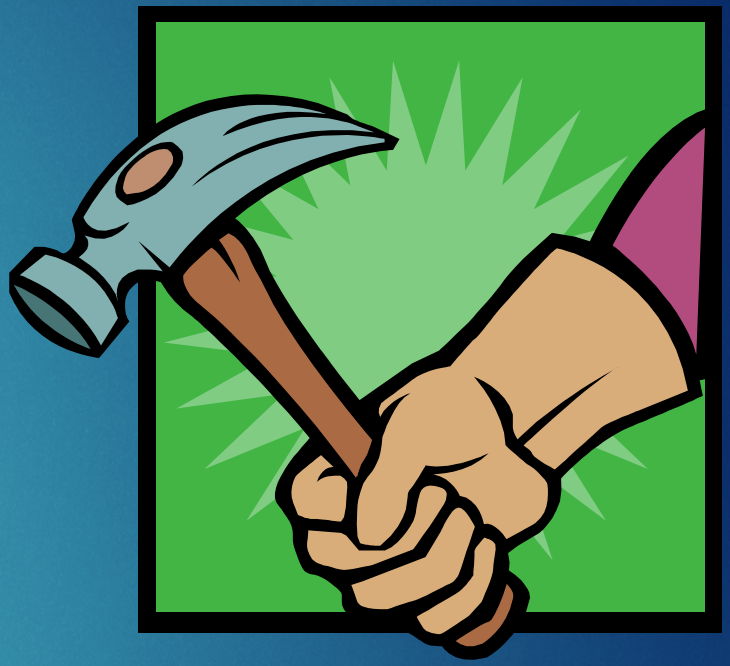
Why We Don't Have "*The Answer*"

- Most liquid products will kill bed bugs if you apply them directly.
- Consumers do not realize that killing bed bugs *we can see* is not the problem.
- Our problem is controlling resistant infestations!!!



Why not just hit each bug with a hammer?

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Use of Heat With Bed Bugs

- Can do things with heat we can't do with traditional treatments
- Eliminate infestations in one service
- Treat items that can't be treated with pesticide
- Considered a "greener " option (reduce amount of chemical)

Steam

- Steam temperature (at the bed bug) must be 130º F (54º C) or greater
- The steam head must be large
- Steam power will kill bed bugs and their eggs
- Steaming is slow and labor intensive

Upholstery and bedding can disperse steam heat
Thermal death point 48ºC

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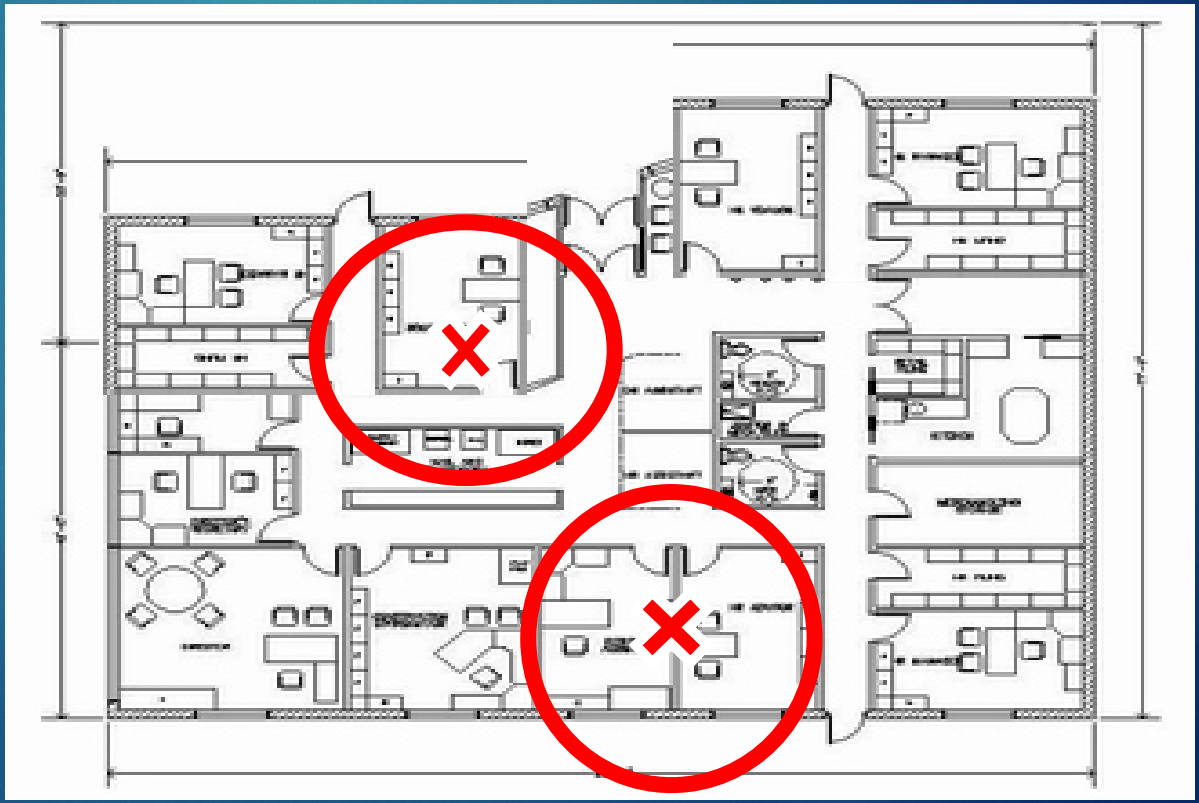
Steve Kells & Temp-Air (2009)

Temperature	Mortality in Time (Minutes)	
	Adults	Eggs
113 ºF	**90 min** vs. (15 min)	**480 min** vs. (60 min)
118 ºF	**2 min**	**90 min**
122 ºF	**< 1 min**	**< 1 min**

Want temperatures over 120 ºF

Why Treat Surrounding Areas?

- Just because the bug was found in one area doesn't mean the person in that area is the source
- Usually the person complaining isn't the source
- Treating entire rooms is not usually necessary



Options, Options, Options

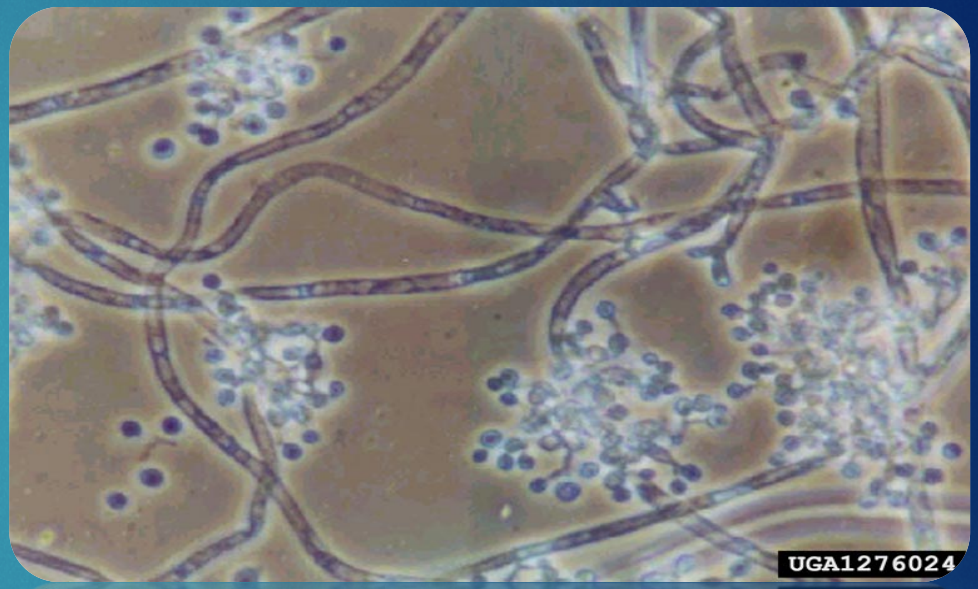
- Steam and Vacuums
- Pesticide
- Heat Chambers/Fumigation
- Canines
- Monitors

The Best Weapon is Education

- Students and parents must be educated
- Fact sheets should be sent home
- If an infestation isn't "knocked down" the problem will just be reintroduced

Emerging Technology: *Beauveria bassiana*

- Biopesticide
- Causes disease in insects
- Harmless to humans and pets
- Application
  - Professional application
  - Specialized equipment & training needed
  - Cracks and crevices in bed frames and box springs
- Used in IPM programs



Emerging Technology: *Beauveria bassiana*

- How it works
  - Bed bugs cross treated surface
  - *Beauveria* spores penetrate cuticle
  - Spores germinate
  - Spread by bed bug to colony
  - Death in 4-7 days
- Efficacy
- Long residual
- Lethal to pesticide resistant strains
- Field trials underway
- For more information:
  - Penn State University Extension website - http://agsci.psu.edu/atlas

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Bed Bugs

Contact Us Share

- Bed Bugs Home
- Learn about Bed Bugs
- — Characteristics of Bed Bugs
- — Finding Bed Bugs
- Protecting Your Home
- Protecting Yourself in Public Places
- Getting Rid of Bed Bugs
- — Do-it-yourself Bed Bug Control
- — Pesticides to Control Bed Bugs
- Bed Bug Information Clearinghouse
- Bed Bug Product Search Tool
- Finding Help with Bed Bug Problems

You are here: EPA Home » Bed Bugs » Bed Bug Clearinghouse by Audience

Bed Bug Clearinghouse by Audience

Search the library by:

Audience | Topic | Type of Resource | Publications of General Interest | Publications in Other Languages

On this page:

- All Audiences
- Emergency Facilities
- Health Centers/Hospitals
- Hotels
- Housing Authorities
- Landlord
- Pest Management Professional
- Retail Facilities
- Residential Consumer
- Schools/Childcare
- Shelters
- Travel/Transportation Services (airlines, trains, buses)
- Workers Entering Homes

All Audiences

Look at the "Publications of general interest" to find items that would contain material of potential interest to all audiences, such as bed bug biology, etc.

You will need Adobe Reader to view some of the files on this page. See EPA's About PDF page to learn more.

Where Do We Go From Here?

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Bed Bugs: Get Them Out and Keep Them Out

- Tackling Bed Bugs: A Starter Guide for Local Government (PDF) (39 pp, 1.5 Mb) EXIT
- Bed bug tip of the month
  Make sure you have bed bugs, not fleas, ticks or other insects.
  More Tips
- Información relacionada disponible en español

Learn About Bed Bugs

- Introduction to bed bugs
- Characteristics of bed bugs
- How to find bed bugs
- Bed bug information clearinghouse
- What landlords need to know
- Bed bugs and schools

Prevent Infestations

- Protecting your home
- Protecting yourself at school or office
- Tips for travel
- Print an information card to carry with you

Get Rid of Bed Bugs

- Using integrated pest management
- Pesticides for bed bug control
- Steps for "do-it-yourself"
- Safety issues in controlling bed bugs
- Find help with bed bug problems

Questions?


...MEANWHILE, ON THAT EARTH-LIKE PLANET 120 TRILLION MILES AWAY...
EWWWW! BEDBUGS!!!

Nationally, School's No. 1 Mammal Pest:

House Mouse
Mus musculus

Rodents: Major Health & Safety Issues

- Allergens (esp. mice)
- 50-60 potential pathogens (Urban rodents & area-specific)
- Food borne illness potential if in food prep areas
- Electrical damage

Mouse Allergens in Urban Elementary Schools and Homes of Children with Asthma

William J. Sheehan, MD[a,b], Pitud A. Rangsithienchai, MD, MA[c], Michael L. Muilenberg, MA[d], Christine A. Rogers, PhD[d], Jeffrey P. Lane, CIH, MPH[e], Jalal Ghaemghami, PhD[f], Donald V. Rivard, BA[g], Kanao Otsu, MD, MPH[h], Elaine B. Hoffman, PhD[i], Elliot Israel, MD[j], Diane R. Gold, MD, MPH[b,k], and Wanda Phipatanakul, MD, MS[a,b]

a*The Department of Pediatrics, Division of Allergy and Immunology, Children's Hospital, Boston, Massachusetts*

b*Harvard Medical School, Boston, Massachusetts*

c*McGaw Medical Center, Northwestern University*

Rodents & School Allergens

Indoor Air 2005; 15: 228–234
www.blackwellpublishing.com/ina

doi: 10.1

Mouse and cockroach allergens in the dust and air in northeastern United States inner-city public high schools

Abstract Considering that high school students spend a large proportion of their waking hours in the school environment, this could be an important location for exposure to indoor allergens. We have investigated the levels of mouse and cockroach allergens in the settled dust and air from 11 schools in a major northeastern US city. Settled dust samples were vacuumed from 87 classrooms, three times throughout the school year. Two separate air samples (flow = 2.5 lpm) were collected by 53 students over a 5-day period from both their school and their home. Mouse allergen (MUP) in the dust varied greatly between schools with geometric means ranging from 0.21 to 133 μg/g. Mouse allergen was detectable in 81% of the samples collected. Cockroach allergen (Bla g 2) ranged from below limit of detection (<0.003 μg/g) to 1.1 μg/g. Cockroach allergen was detected (>0.003 μg/g) in 71% of the dust samples. Bla g 2 was detected in 22% of airborne samples from the schools. By comparison, mouse allergen was only detected in 5%. These results indicate that the school may be an important location for exposure to allergens from mice and cockroaches and is an indoor environment that should be considered in an overall allergen intervention strategy.

G. L. Chew, J. C. Correa, M. S. Perzanowski
Department of Environmental Health Sciences, Mailman School of Public Health, Columbia University, New York, NY, USA

Key words: School; Mouse; Cockroach; Allergen; Airborne; Dust.

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Received for review 18 February 2005. Accepted for

Rodents: School Health Violations

Retail Food Inspection Report
Notice of Violations

Complaint____ Pre-opening____ Reinspection____ Routine__X__

Permit Number	E-Code	Type of Establishment		
36-0060705	0000	0000 - No Ecode Association Found		
Name of Establishment		Owner		
A.P. TUREAUD ELEMENTARY		Recovery School District		
Location	City	Zip	Date	Time
2021 PAUGER STREET	NEW ORLEAN	70117	12/14/2010	12:53:56 PM

LAC TITLE 51 PART XXIII

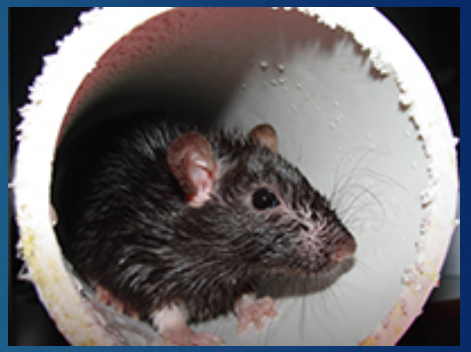
CRITICAL ITEMS: These items relate directly to the protection of the public from foodborne illness. These items MUST BE CORRECTED IMMEDIATELY (see compliance schedule below). Repeat violations may lead to enforcement actions or permit suspension.

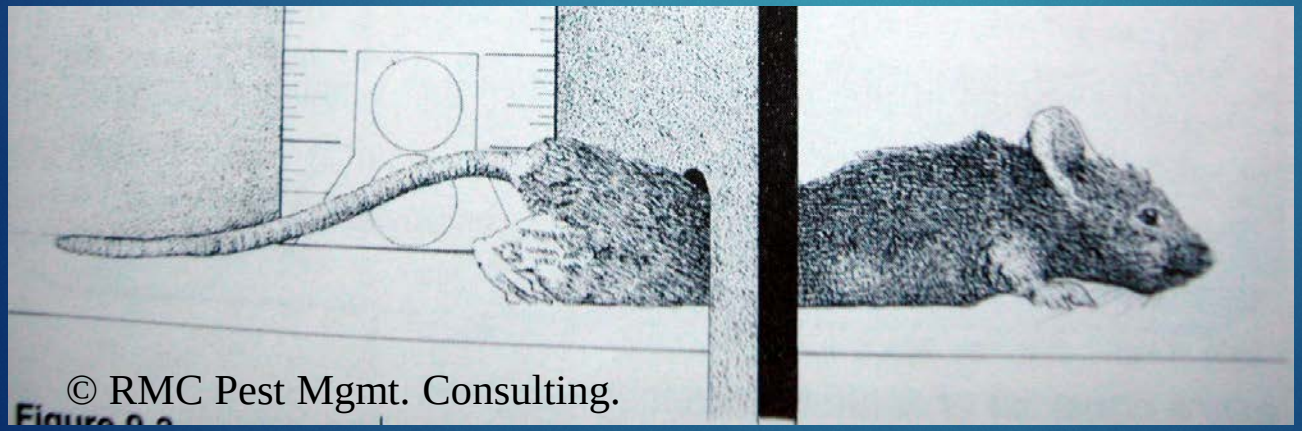
Category	Code Reference	Description of Violations
1	1507	Ready to eat, potentially hazardous food prepared on premises and held for more than 24
		hours is not date marked. - Violation was corrected.
	3501	Rodents are present in the establishment.
		General Comment: rodent dropping found in single service forks and nacho tray boxes.
		discarded

NON - CRITICAL: These items relate to design, sanitation and maintenance of food service operations. These items should be corrected by the next regular inspection or according to the compliance schedule (see below) established by this office.

Category	Code Reference	Description of Violations
15	3505	Openings are not protected against the entry of rodents or insects.
15	3703	Walls/ceilings or attached equipment are not in good repair.
16	501	A valid permit to operate is not posted in a conspicuous location.

Rodents - How they get in





Plumbing and pipe entries – Could become a rodent highway

This pipe runs from room to room, the aluminum casing around the pipe was a rodent highway until it was sealed

Seal all pipes at the entry points

- Steel wool mixed with a sealant or concrete
- Foam sealant over steel wool or wire mesh

Rodents - Where they go…

- Warm areas nearby food
- Cluttered rooms and areas.
- Quiet places
- Ceilings, furniture, desks
- Concrete hollow block

Vending Machines

- Spilled or broken products attract mice and roaches
- Ensure scheduled cleaning which may need to be negotiated contractually with the vendor
- Monitor

Highly Rodent Vulnerable Areas (RVAs) of Typical Schools

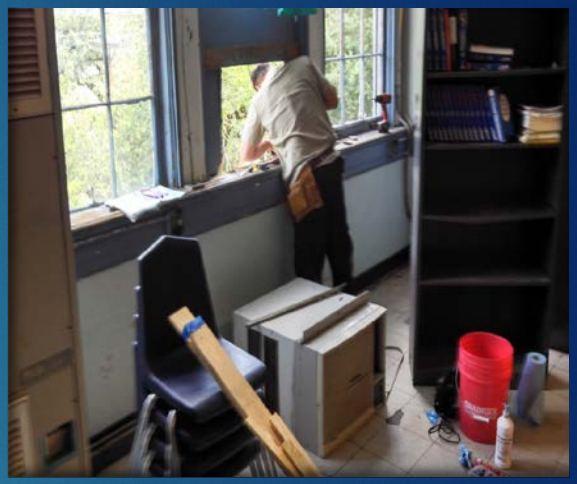
- Kitchens & Store rooms
- Storerooms (especially conc. Hollow block + 2x4 / plywood shelving
- Beneath counter voids in serving zones
- Band boosters storage and kiosks
- Science classrooms
- Any suspended ceilings above the above areas
- Crawl space areas (Norway rats)
- Soffits zones ands attics (Roof rats)
- Exterior earthen areas, underground, nearby food dumpsters

Know proper monitor placement and protocols

Mouse bait stations, no date, pellets, improper placement and use

More exclusion solutions...

- Add steel plates to large holes under doors
- Use door sweeps for gaps under and around doors
- Remove old air conditioners and repair window sashes



Please Don't Feed the Bears

Garbage is the #1 bear attractant

- As populations increase - more people live and recreate in areas occupied by bears
- Human-bear conflicts are increasing
- Bears can smell food from over a mile away
- Normally bears are shy
- Their need to find food overwhelms fear

Garbage: Recipe for Damage and Disaster

- Bears easily become dependent of food source
- Dependency on un-natural food = disaster and damage
- Takes weeks to reacclimatize to wild food sources
- Bear /Human conflicts caused by ignorance

Use Bear Resistant Dumpsters

- Secure garbage
- Never overload dumpsters
- Place – do not throw
- Bear resistant containers, shed, caddy, dumpsters
  - Reduces bear incidents
- Tie bags, keep lids closed tight to reduce smells
- Heavy fencing – electric (where practical)

When in Bear Country… Have a Bear Plan

- Everyone is in a safe place
- Bear has clear escape route
- Scare the bear: loud noise
- Scan for what attracted the bear
- Secure food source
- Plan for event days

Educate: Be Bear Aware

- Educate surrounding neighborhood
- School distribute bear awareness fliers home
- PTA / HAS; Youth: 4-H / Scouts
- Feeding bears is illegal in many states
- Meet with local wildlife agency for more information

Educate Surrounding Neighborhoods

More on Education:

- Bears will eat anything
- Compost attracts
- Birdfeeders and seed attract
- Pet food attracts
- Outdoor grills, fire pits
- Fruiting trees and dropped fruit attract

Steps to Prevent Most Outdoor Pests

- Place Garbage containers away from building entrances
- Dumpsters should have close-fitting lids and be kept closed
- Report holes or breaks to waste management vendor to replace
- Keep area around dumpsters clean and free of debris
- Clean garbage cans & dumpsters frequently- prevent waste build-up
- Keep dumpsters on a hard impermeable surface

Contending with Vertebrate Pests Around Schools

Center of Expertise for School IPM

Red Squirrels & Flying Squirrels


Photo: Donna Dewhurst

- ½ size of gray squirrel
- Evergreen trees
- Aggressive/vocal


Photo: Larry Master

- Smaller than reds
- Skin flaps & Flat tail
- Gregarious
- Mature woods
- Typhus

Hole Sizes

- Gray/Fox squirrel
  - 2 to 3 inches

- Red squirrel
  - >1-inch

- Flying squirrel
  - <1-inch

Photos: Stephen M. Vantassel

Wildlife Control Consultant, LLC

Gray/Fox Squirrel Holes

Red Squirrel Holes

- Can enter at ground level

Flying Squirrel Signs

Photos: Stephen M. Vantassel

Wildlife Control Consultant, LLC

Habitat Modification

Cut back branches 10’ from roof

Secure trash cans

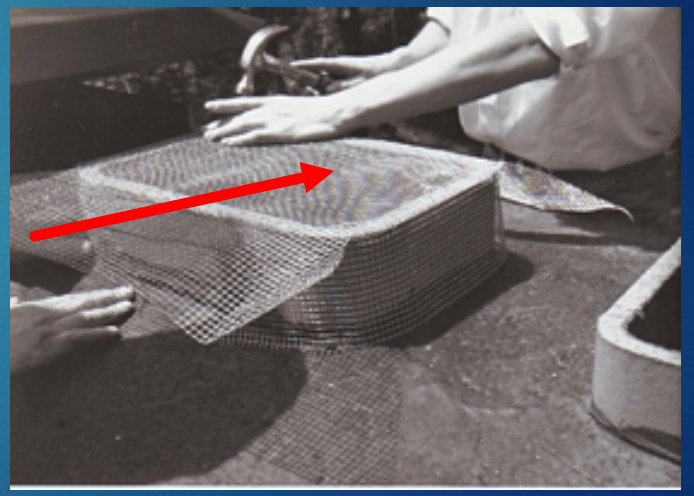
“Squirrel-proofed” Feeder

Photos: Stephen M. Vantassel

Wildlife Control Consultant, LLC

Secure Vents & Chimneys

Wrong



Photos: Stephen M. Vantassel

Wildlife Control Consultant, LLC

Secure Openings

- Stink Pipes
  - Squirrels become trapped in these
  - A.K.A. Roof Vent Pipe Covers
  - Use caution in northern climates

- Ridge-vents
  - Frequently not secured

Frightening Devices

USELESS

Above 3 Photos: Stephen M. Vantassel

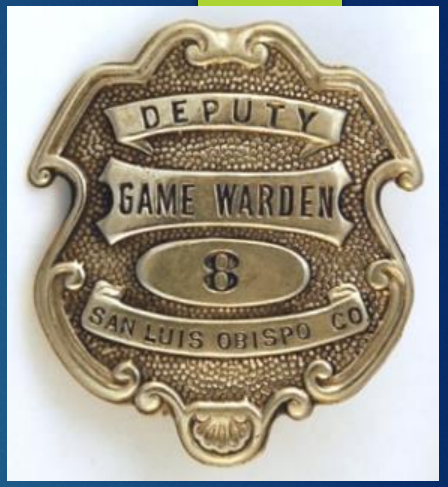
Wildlife Control Consultant, LLC

Repellents—limited use

- Predator Urine
  - Fox & Coyote--
- Taste Repellents
  - Use where squirrels gnaw
  - E.g. Havahart Critter Ridder
    - Capsaicin, Black pepper, Piperidine
  - E.g Ropel®
    - Denatonium saccharide

Legalities

- Tree squirrels are typically protected by state game laws
- Some communities ban the use of certain devices to control wildlife
- Check laws carefully before initiating control



Toxic Baits & Fumigants

- None registered for tree squirrels
- Unclear how many squirrels killed by toxicants due to improper claims of "mice"

Trapping Safety

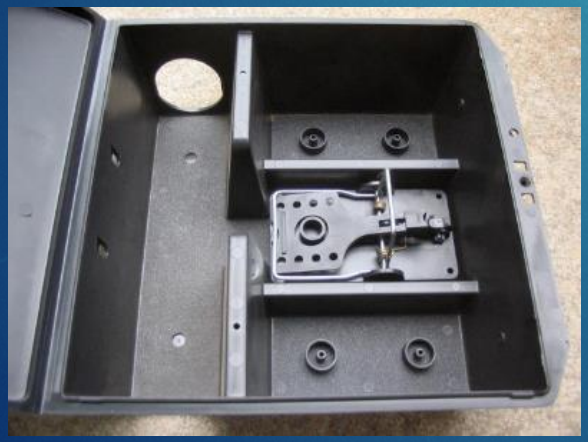
- Wear appropriate safety equipment, e.g. gloves
- Avoid setting traps in areas with high human /pet traffic
- Check traps daily. Don't set them if you can't check them the next day
- Consider weather conditions
- Use smallest size cage traps
- 5x5x18" spring-loaded door
- Cover 50% of cage


Photo: Stephen M. Vantassel

Trapping-Gray Squirrels

Set lethal traps out of reach and public view

- Use enough rat traps
- Set traps inside protective container when trapping outside
- Pre-bait
- Baited with peanut butter and seeds
- Keep out of view of birds



- Kania Trap
- Tunnel Traps (UK Humane standard)

Photos: Stephen M. Vantassel

Wildlife Control Consultant, LLC

Vertebrate Pests and School IPM - QUESTIONS

- What animals frequent your school properties?
  - Food? Nesting/Denning locations?
- Are there safety risks involved in their presence?
  - Do their dens or burrows create a safety risk?
  - Do they potentially pose a health hazard?
- Why are they on School property? (food issue?, neighborhood sanitation issues, Denning or living there?)

Will we try to control or remove them from school property?

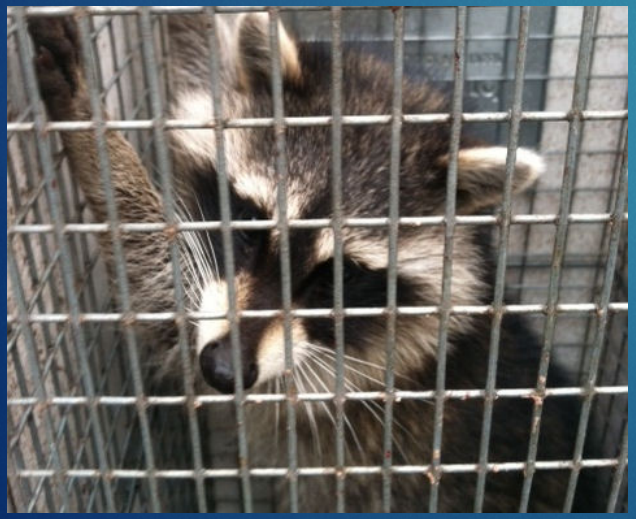
- MAYBE!
  - If they, or their activities, are a risk to students, staff, or visitors to schools – YES
  - If they are part of the normal environment and pose no direct risks – NO
  - If regulatory restrictions prohibit control (bats during certain times of year) – NO
  - If they can humanely be caught and removed and they are potentially a risk – YES? MAYBE?

Wildlife and Schools

- Wildlife are part of the environment surrounding our schools/our schools are part of their environment
- Not all need trapping or control
- Understanding their biology and behavior is essential to determining when control is necessary
- When wildlife pose a real health risk they need removal or we may need to alter our environment or the wildlife's behavior to assure a safe school environment

Raccoons

- Inside classroom was evidence of entry by the raccoons and even footprints on the wall
- Some bloody where they had injured themselves getting in and out



Keeping Bats Out of Schools

How / Where Do They Get In?

Potential Bat Access = Any Hole / Space / Joint / Crevice > ½ Inch

School Bat Observations

- Bats favor tall structures (2- Story or Taller)
- Bats favor areas near heavy light pollution (i.e. Athletic Field Lights)

Images: Fly By Night, Inc.

School 1 – Gym with small bat colony

- Bats were with young
- Morning inspections and cleanup
- Allowing young to leave the roost prior to start of the work
- Ultrasonic device for bat exclusion
- Sealed up the building
- New soffits once the bats had left the building

- Blocks not sealed against roof structure
- Continuous point of entry
- Difficult to exclude

School #1 – Completed Repairs

- New Panels replace soffit
- A tight fit against wall
- Caulked the joints
- Boxed around gutters
- Building aesthetics enhanced

School #2 - High School with bats behind gutters

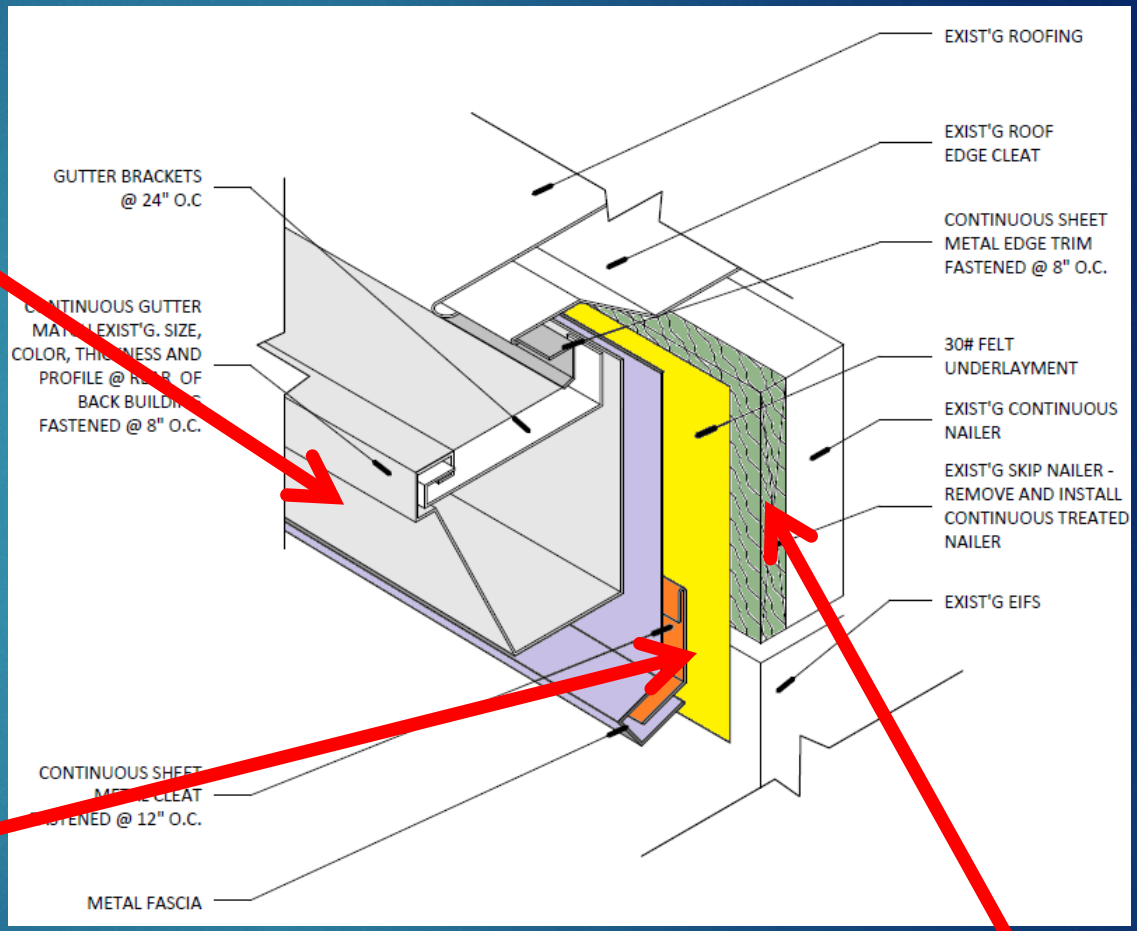
- Linear Foot of Continuous Entry
- Daily accumulation of guano outside
- Odor of Guano/Ammonia
- Bats were removed and released
- Significant impact to students – Closing was last resort
- Closed the gym for 2 weeks
- 2 gyms, weight rooms, lockers rooms, choir room, band room
- Deferred to professionals (Professors; LA Wildlife & Fisheries)

Added Metal Flashing 1” x 2”
Screwed & Caulked into place

School #2 – Details of Solution

- New Gutters (Gray)

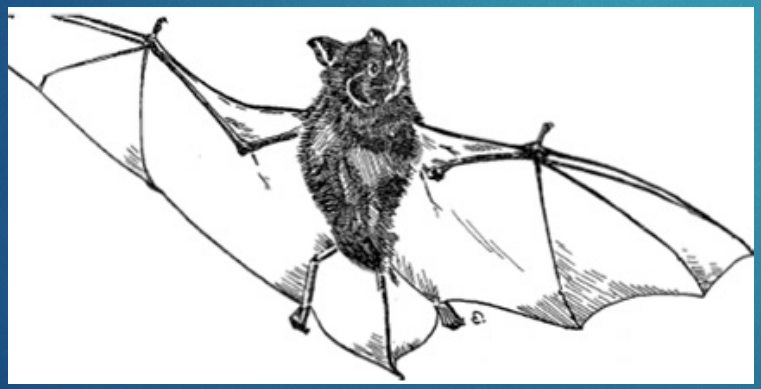
- Added Continuous Cleat (orange) fastened to wall
- Added Flashing (purple) behind new gutter (Gray)



Added Green Board to fill Void where bats were living

School #3 - Occasional Invaders

- Sealed out suspected points of entry
- Yearly seasonal complaint
- Sealed possible entry points
- Last complaint –see photo
- Occasional invaders – during migration season



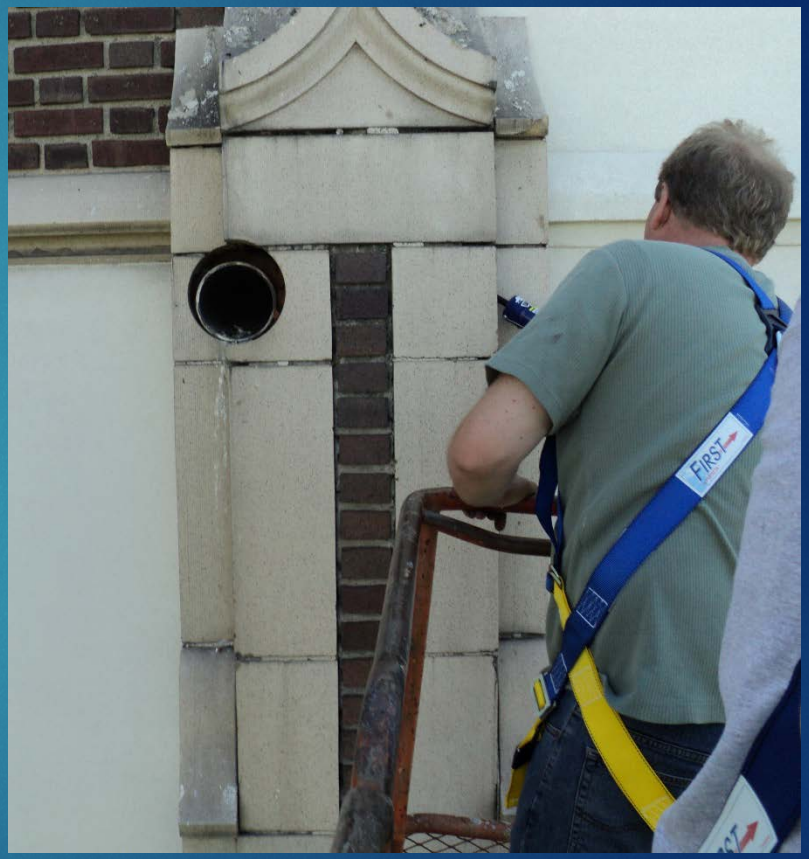
Little brown bat, *Myotis lucifugus*
Has been devastated by White Nose Syndrome

School #4 - What Is Behind The Wall?

- Horrid smell
- Bat guano
- Dead bats

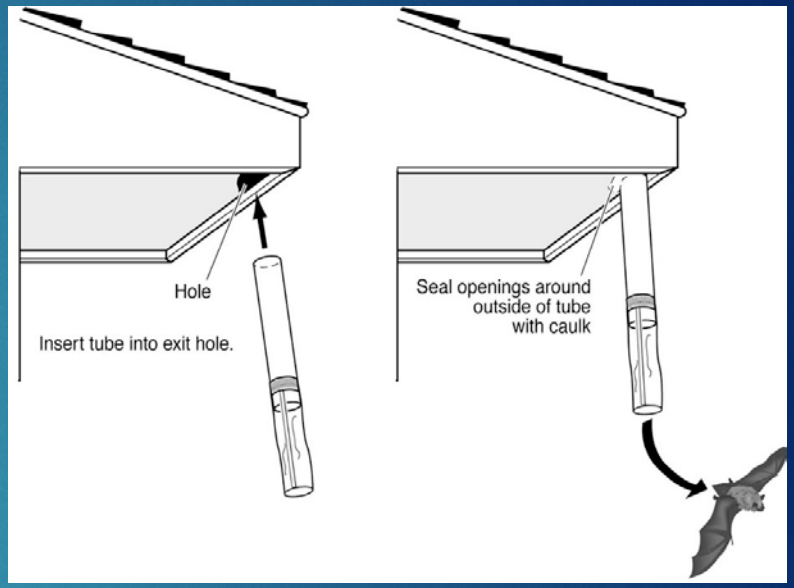
Bat Exclusion Solutions

- Erect bat houses for migrating bats
- Seal all entry holes



Exclusion: The Only Real, Effective Solution

- Provide Alternative Roost(s)
- Identify Entries/Exits
- Install One-Way Valves
- Prevent Re-Entry



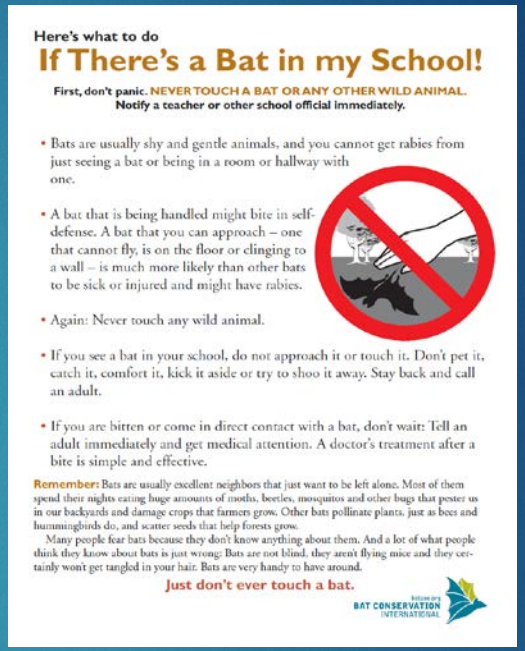
Tadarida exiting from exclusion tube

To a bat, a crevice in a bridge or building may not seem different from one behind loose bark

One or Two Bats In Your Home, School or Office?

Resources available at batcon.org

- "Bat Management: Excluding Bats from Manmade Structures" by L. & T. Finn;
- BCI's "Removing a Bat" video
- BCI's "Exclusion Guidelines"



Here's what to do

If There's a Bat in my School!

First, don't panic. NEVER TOUCH A BAT OR ANY OTHER WILD ANIMAL. Notify a teacher or other school official immediately.

- Bats are usually shy and gentle animals, and you cannot get rabies from just seeing a bat or being in a room or hallway with one.
- A bat that is being handled might bite in self-defense. A bat that you can approach – one that cannot fly, is on the floor or clinging to a wall – is much more likely than other bats to be sick or injured and might have rabies.
- Again: Never touch any wild animal.
- If you see a bat in your school, do not approach it or touch it. Don't pet it, catch it, comfort it, kick it aside or try to shoo it away. Stay back and call an adult.
- If you are bitten or come in direct contact with a bat, don't wait: Tell an adult immediately and get medical attention. A doctor's treatment after a bite is simple and effective.

Remember: Bats are usually excellent neighbors that just want to be left alone. Most of them spend their nights eating huge amounts of moths, beetles, mosquitos and other bugs that pester us in our backyards and damage crops that farmers grow. Other bats pollinate plants, just as bees and hummingbirds do, and scatter seeds that help forests grow.

Many people fear bats because they don't know anything about them. And a lot of what people think they know about bats is just wrong: Bats are not blind, they aren't flying mice and they certainly won't get tangled in your hair. Bats are very handy to have around.

Just don't ever touch a bat.

Batcon.org BAT CONSERVATION INTERNATIONAL

There is no need to panic—bats will usually leave on their own if given the opportunity, but if necessary, they CAN be captured safely (either for release, rescue or for rabies testing if any human or pet bite exposure has occurred).

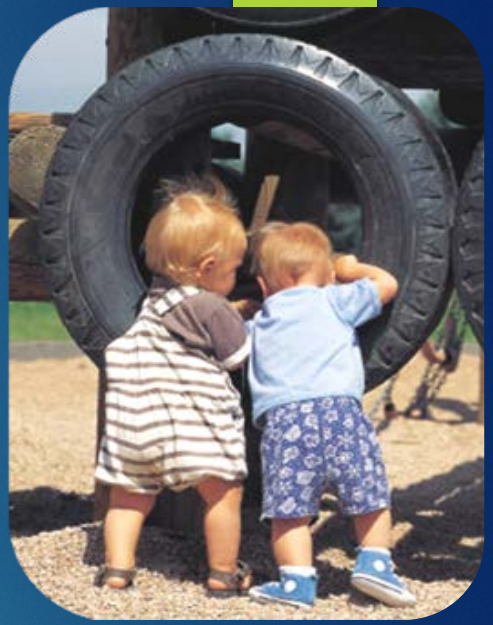
ALWAYS WEAR GLOVES TO PROTECT YOURSELF AND THEM!

Integrated Mosquito Management

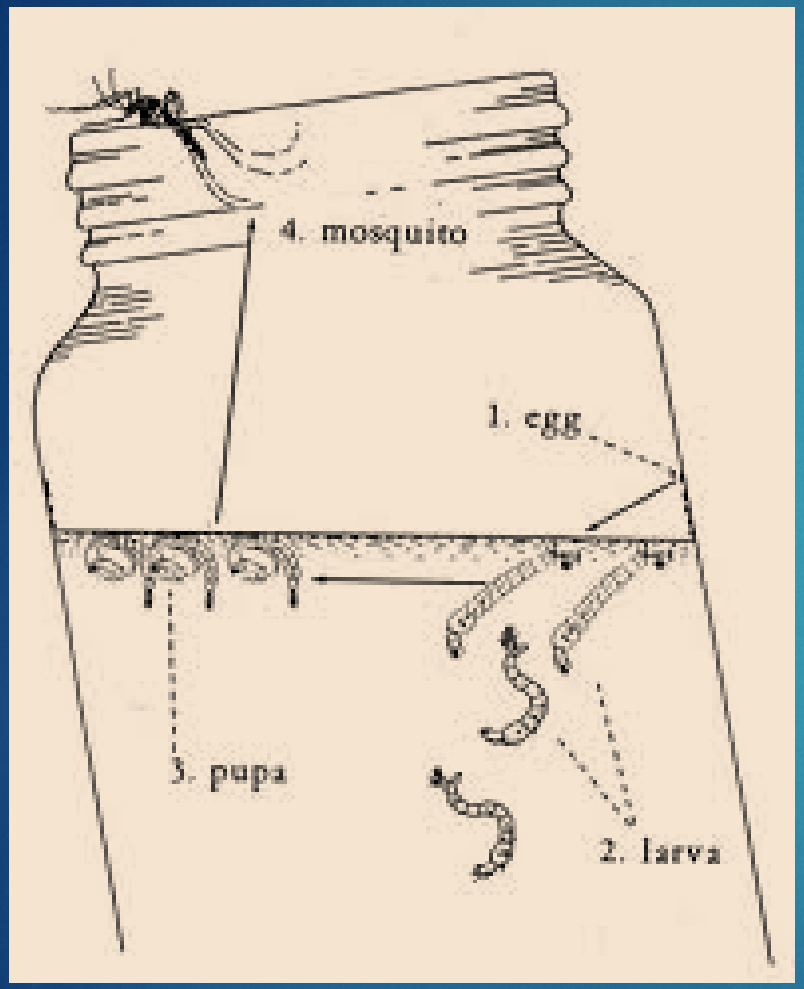
Center of Expertise for School IPM

Aedes Breeding Sites

- Primarily man-made containers - cans, jars, cisterns, fountains, planters, plastic food containers, used tires, and tarps.
- Prefer clean water
- Need only ¼" of water - bottle caps or puddles
- Toys and children's play equipment that collect water

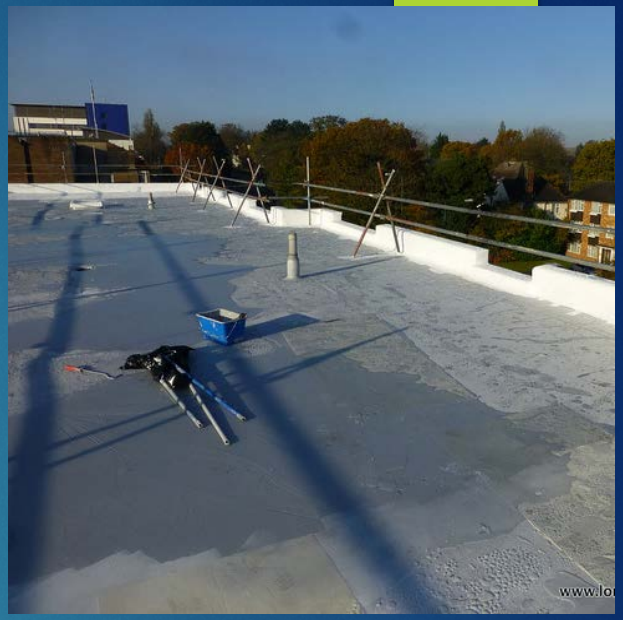


Just One Example…



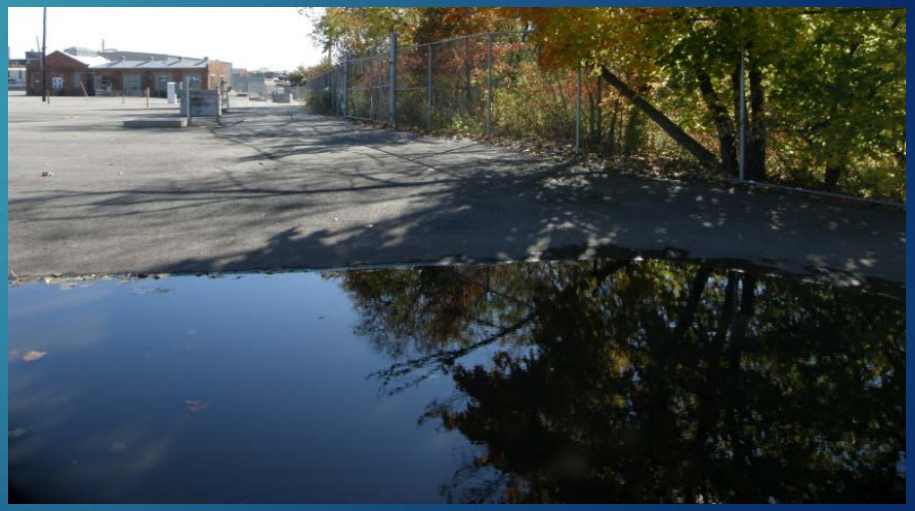
More Community Mosquito Habitats

- Rain gutters
- Flat roofs
- Garbage cans and dumpsters without proper drainage



Clogged / Damaged Storm-water Drainage Systems

- Standing water occurs when drainage is blocked
- Standing water = prime larval habitat
- Monitor swales, ditches and drains



Culex Breeding Sites

- Prefer standing water rich in decomposing organic material
  - Dead leaves, grass clippings, and algae break down to produce an attractive organic infusion
- Flooded wooded areas, catch basins, storm sewers, cisterns, and flood water pools

Natural Breeding Sites

- Tree holes
- Leaves that gather to form "cups"
- Long standing puddles
- Potholes

Tree Holes

- Mosquitoes breed in water found in tree holes
- Prevent by filling holes with expanding insulating foam
  - Do not use concrete, or bricks