Enhancing Your School IPM Program
Pest Specific Strategies

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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

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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 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

- Blacklegged Tick (Ixodes scapularis)
  - Adult female
  - Adult male
  - Nymph
  - Larva

Tick Safe Zone:
- Wood chips along stone wall & under foundation plantings
- 3’ wide or greater barrier
- Wood pick

Tick Zone:
- Meadow grasses, wildflowers
- Vegetable garden with deer fence

Photo of individuals in protective gear, running through a wooded area.
Tick Prevention: Exclude deer

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

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Mouse-Targeted Tick Control Devices

Tickboxtc.com

Tickencounter.org

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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 for less deer browsing
- Create 3’ wood chip or gravel border between turf and woods

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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

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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

Tick Management Handbook, K. Stafford, 2004
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

1-800-221-5821
www.mainehealth.gov

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

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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
More School Nesting Locations

Mark Hardin Photos
Chain link fences
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)
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

Mark Hardin Photo
Materials for sealing nest entrances
Sealing wasps out of other posts
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 source when 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

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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

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

“Kentucky school bans backpacks and lunch boxes after bedbugs appear...” - Sept. 7, 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, <\(\frac{1}{4}\) 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**
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!!!!
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!
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!
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
Vacuums can be used to quickly eliminate large numbers of bugs.
Vacuuming!

- Immature bed bugs often hide in the shed skins of their older siblings
- Vacuum the floor, furniture, and perimeter,
- Remove bed bug exuvia!!!
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 $5000 bed bug carcass

The price of panic!
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?
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 130° F (54° 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 48° C

Virginia Tech
Invent the Future®
<table>
<thead>
<tr>
<th>Temperature</th>
<th>Mortality in Time (Minutes)</th>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>Adults</td>
<td>Eggs</td>
<td></td>
</tr>
<tr>
<td>113 °F</td>
<td>90 min vs. (15 min)</td>
<td>480 min vs. (60 min)</td>
<td></td>
</tr>
<tr>
<td>118 °F</td>
<td>2 min</td>
<td>90 min</td>
<td></td>
</tr>
<tr>
<td>122 °F</td>
<td>&lt; 1 min</td>
<td>&lt; 1 min</td>
<td></td>
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</table>

Want temperatures over 120 °F
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](http://agsci.psu.edu/atlas)
Bed Bug Clearinghouse by Audience

Search the library by:

<table>
<thead>
<tr>
<th>Audience</th>
<th>Topic</th>
<th>Type of Resource</th>
<th>Publications of General Interest</th>
<th>Publications in Other Languages</th>
</tr>
</thead>
</table>

On this page:

- All Audiences
- Retail Facilities
- Emergency Facilities
- Residential Consumer
- Health Centers/Hospitals
- Schools/Childcare
- Hotels
- Shelters
- Housing Authorities
- Travel/Transportation Services (airlines, trains, buses)
- Landlord
- 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.
Meanwhile, on that Earth-like planet 120 trillion miles away...

EWWWW! BEDBUGS!!!
Nationally, School’s No. 1 Mammal Pest:

House Mouse
Mus musculus
Allergens (esp. mice)
- 50-60 potential pathogens (Urban rodents & area-specific)
- Food borne illness potential if in food prep areas
- Electrical damage
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.
### Retail Food Inspection Report
#### Notice of Violations

<table>
<thead>
<tr>
<th>Permit Number</th>
<th>Pre-opening</th>
<th>Reinspection</th>
<th>Routine</th>
<th>X</th>
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<tbody>
<tr>
<td>36-0060705</td>
<td>E-Code</td>
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<tr>
<td>0000</td>
<td>0000</td>
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<td></td>
</tr>
<tr>
<td>Type of Establishment</td>
<td>Owner</td>
<td>Recovery School District</td>
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<td></td>
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<tr>
<td>Name of Establishment</td>
<td>A.P. TUREAUD ELEMENTARY</td>
<td>NEW ORLEANS</td>
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<tr>
<td>Location</td>
<td>City</td>
<td>Zip</td>
<td>Date</td>
<td>Time</td>
</tr>
<tr>
<td>2021 PAUGER STREET</td>
<td>NEW ORLEAN</td>
<td>70117</td>
<td>12/14/2010</td>
<td>12:53:56 PM</td>
</tr>
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</table>

### 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.

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

**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.

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

Center of Expertise for School IPM
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 and 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

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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

85 Center of Expertise for School IPM
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

Center of Expertise for School IPM
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)

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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

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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

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Red Squirrels & Flying Squirrels

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

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

Photo: Larry Master

Wildlife Control Consultant, LLC
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
Wrong
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
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

Photos: Stephen M. Vantassel
Wildlife Control Consultant, LLC

- Kania Trap
- Tunnel Traps (UK Humane standard)
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.

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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

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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

Exclusion: The Only Real, Effective Solution

Exclusion: The Only Real, Effective Solution
To a bat, a crevice in a bridge or building may not seem different from one behind loose bark.
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...

1. egg
2. larva
3. pupa
4. mosquito

Center of Expertise for School
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 breakdown to produce an attractive organic infusion
- Flooded wooded areas, catch basins, storm sewers, cisterns, and flood water pools

Center of Expertise for School IPM
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

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