Integrated Pest Management Program for Wylie ISD

I. Policy Statement

Integrated Pest Management (IPM) is a pest management strategy that relies on accurate identification and scientific knowledge of target pests, reliable monitoring methods to assess pest presence, preventative measures to limit pest problems and whenever economical and practical, multiple control tactics to achieve best control of pests. These tactics will possibly include, but are not limited to, the judicious use of pesticides. (TAC 7.114) All IPM practices will be in conjunction with all Texas school IPM rules and regulations. Wylie ISD will have and adhere to the thresh holds mentioned and take action steps depending on the type of pest problem uncovered.

Structural and landscape pests can pose a significant problem to people, property and the environment. Pesticides and herbicides can also pose risks to people, property, and the environment. It is therefore the Policy of Wylie ISD to incorporate Integrated Pest Management (IPM) procedures for control of structural and landscape pests, as required by statute.

Pests are populations of living organisms (animals, plants, microorganisms) that can interfere with the day-to-day operations of the Wylie ISD campuses. Strategies for managing pest populations will be influenced by the pest species and whether that species poses a threat to the students, staff, property, and/or the environment. Pest management plans will be developed for the Wylie ISD and will include pest management measures.

Pests will be managed to reduce any potential human health hazards to protect against a significant threat to public safety, to prevent damage to Wylie ISD structure or property, and to enhance the quality of life for students and staff.

The choice of using chemical pesticides will be based on a review of all other known options and a determination that these options are not acceptable or feasible. Cost or staffing consideration alone will not be adequate justification for use of chemical control agents. Selected non-chemical pest management methods will be implemented, whenever possible to provide the desired control. It is the policy of Wylie ISD to utilize IPM principles to manage pest populations adequately. The full range of alternatives, including no action will be considered. When it is determined that a pesticide or herbicide must be used in order to meet the pest management goals, the least hazardous material will be chosen.

The IPM Coordinator, Administrator, and staff will be educated about the potential school pest problems and the IPM policies and procedures to be used to achieve the desired pest management objectives.

The IPM Coordinator will maintain records of pesticide and herbicide use and will notify the Wylie ISD staff and students of upcoming pesticide treatments. Notices will be posted in designated areas at each site.

Pesticide purchase will be limited to the amount authorized for use in one year. Pesticide will be stored and disposed in accordance with the label directions and state regulations. Pesticides will be stored in an appropriate secure site not accessible to students or unauthorized personnel.

Pesticide applicators will be educated and trained in the principles and practices of integrated pest management and use of pesticides. They will follow regulations and label precautions. Applicators will be certified and comply with the Wylie ISD policy. Only licensed applicators (in house or external) will be allowed to handle, use, and apply pesticides.

II. IPM Management

The IPM Coordinator will be trained through a Texas Structural Pest Control Service approved IPM Coordinator training course. The IPM Coordinator will design a pest management system and maintain IPM Policies. The IPM Coordinator is the person who observes and evaluates the site or directs others to do so and decides what needs to be done to achieve the site management objectives.

Wylie ISD may contract with a commercial pest control company(s) to meet the needs of the facility or perform this work in-house with qualified personnel. Using either method, the designated party will make detailed site-specific recommendations for structural and procedural modifications to achieve pest suppression. Any contractor used shall provide evidence of sufficient expertise in pest control and IPM principles and practices.

The Wylie ISD IPM program includes educating all of those involved in the program. This education should include the administrators, teachers, and auxiliary staff.

III. Pest Management Objectives

- Manage pests that may occur on campus to prevent interference with the learning environment of the students
- Preserve the integrity of the buildings and structure
- Provide the safest playing or athletic surfaces possible

IV. IPM Cycle

- INSPECTION – Inspection of all facilities and grounds will be conducted on a quarterly basis by district personnel or by pest management contractors. A detailed building inspection of each campus will be conducted annually to determine if the building has any conducive conditions for pests and to develop a list of structural and landscape improvements.

- IDENTIFICATION – Accurate identification of pest is a vital part of ensuring that proper control methods will be used. Local resources will be used to help in

identification.

- ACTION – Habitat modifications, exclusions, repair, and sanitation efforts will be the first actions considered. Action threshold will be considered before any other actions are considered. The action threshold will reflect how many pests can be tolerated for a specific site. The presence of some pests does not in itself necessarily require action.

- EVALUATION – If it is determined that further action is needed, then there will be a follow up with an appropriate pesticide approved by the IPM Coordinator

V. Thresholds

A threshold is the boundary between a tolerable and an intolerable level of a pest. The higher the threshold, the more pests can be tolerated. Setting a zero tolerance for pests in a school district is unattainable, not in the best interest of our community and student public health, and not realistic for IPM. Instead, action plans for the monitoring, threshold, response, and most importantly, prevention of pests will be utilized.

Some level of pest presence, except in the cases of a few serious health or quarantined pests, can usually be tolerated. Thresholds can be multi-leveled and used to trigger different types of management actions, including actions other than pesticides. The thresholds in use by Wylie ISD have been developed in collaboration with the Texas A&M AgriLife Extension Service for use in a school environment.

Ants (common house-infesting)	
Classrooms and other public areas:	3 ants per room
Infirmary:	3 ants per room
Kitchen:	3 ants per room
Maintenance and storage areas:	20 ants per 100 square feet in two successive monitoring periods
Outside grounds:	2 field ant mounds per 250 square feet
Ants (Carpenter)	
Classrooms and other public areas:	3 ants per room
Infirmary:	3 ants per room
Kitchen:	5 ants per room
Immediate action if ant colony inside or within 25 feet of any building	
Ants (Fire)	
Classroom and other public areas:	3 ants per room
Infirmary:	3 ants per room
Kitchen:	3 ants per room
Maintenance and Storage areas:	10 ants per 100 square feet in two successive monitoring periods.
Outside Grounds:	Any fire ant mound

Bees (Honey)

Classrooms, Infirmary, Kitchen and Public Areas: 3 bees
Maintenance areas: 10 bees
Outdoors: No Action unless children are threatened and to be relocated by qualified beekeepers whenever possible. Handled by a qualified beekeeper whenever possible.

Cockroaches (German)

Classrooms and other public areas: 1 per room
4-10 cockroaches track down infestations, review sanitation, trash handling, clutter, open equipment, check accessible areas; vacuum and otherwise clean room and apply containerized baits or baits/gels for crack and crevice treatment
Infirmary: 1 cockroach per room
Kitchen: 1 cockroach per room
Maintenance areas: 3 cockroaches per room

Grain and Flour pests

Found in food for human consumption: 1 per package or container
Pet food: 1 if escaping from packaging

House Flies

Classrooms and other public areas: 5 flies per room
Infirmary: 2 flies per room
Kitchen: 2 flies per room
Maintenance areas: 8 flies per room
Outside grounds: 10 flies around any one trashcan or 20 flies around a dumpster.

Mice:

Indoors: Any mouse sightings or evidence of mice (droppings, tracks, etc) triggers pest management action.
Outdoors: Any noticeable burrows or activity in student areas

Rats

Indoors: Any rat sighting or evidence of rats (such as droppings, tracks) triggers pest management action
Outdoors: Any active burrows or activity

Yellow-jackets/Hornets

Classrooms and public areas: 1 yellow jacket or hornet and any area if children are threatened.

Outdoors: Action necessary if nests are present in or near student activity area.
Trash can or dumpster: 10 in 10 minutes at trash can or dumpster

VI. Indoor IPM Strategies

Typical Pests: Mice, Rats, Cockroaches, Ants, Flies, Spiders, Termites, and Microorganisms

Entryways: Doorways, Overhead doors, Windows, and Openings around pipes, Electrical fixtures, and Duct(s).
• Keep exterior doors shut when not in use
• Place weather stripping around doors
• Caulk and seal openings in walls
• Keep vegetation at least one foot from the structure

Classrooms/Offices: Including Performance Hall, Gymnasiums, Hallways, Offices and Classrooms
• Allow food and beverages only in designated areas
• Keep indoor plants healthy
• Keep areas as dry as possible by removing standing water and water damaged and wet materials
• In the all classrooms, store animal foods in sealed containers and regularly clean cages
• In all areas remove dust and debris
• Routinely clean lockers and desks
• Frequently vacuum carpeted areas

Food Preparation and Serving Areas: Dinning Hall, Kitchen, Teacher's Lounge, Vending Machine areas and Food Storage Rooms:
• Store food in containers that are inaccessible to pests
• Store waste in containers that are inaccessible to pests
• Remove all waste at the end of each day
• Place screens on vents, windows and floor drains
• Remove all food debris including crumbs
• Fix dripping faucets and other water leaks
• Promptly clean food preparation equipment after use
• Caulk or paint to seal cracks and crevices

Rooms with Extensive Plumbing: Bathrooms, rooms with sink, locker rooms and crew spaces:
• Promptly repair leaks and correct other plumbing problems
• Routinely clean floor drains, strainers and grates
• Keep areas dry
• Store paper products or cardboard boxes away from moist areas and direct contact with the floors

Maintenance Areas: Mechanical rooms, Janitorial rooms, etc.:
• Allow eating only in designated eating rooms
• Clean trash cans regularly
• Use plastic liners in trashcans
• Keep areas clean and dry as possible
• Store paper products or cardboard boxes away from moist areas and direct contact with the floors and walls.

VII. Outdoor IPM Strategies

Typical Pest: Mice and Rats. Turf Pest such as board-leaf and grassy weeds. Insects such as beetle grubs or sod webworms and turf disease.
Ornamental pest such as plant diseases, insects such as trips, aphids, Japanese beetles and bagworms.

Parking Lots, Loading Docks, Refuse Dumpsters:
• Regularly clean trash containers and gutters
• Regularly remove all waste and paper debris
• Secure lids on trash containers
• Repair cracks in pavement and sidewalks
• Provide adequate drainage

Turf: Lawns, Athletic Fields and Playgrounds:
• Select turf types best adapted for the area
• Adjust mowing height to grass type
• Vary mowing patterns to reduce soil compaction
• Do not over or under water turf water in the "A.M."
• Provide good drainage
• Periodically inspect turf for evidence of pest or diseases
• Have soil analyzed to determine fertilizer requirements
• Time fertilizer applications on an appropriate time
• Aerate soil periodically

Ornamental Shrubs and Trees:
• Apply fertilizer to annual and perennials during active growing season
• Apply fertilizer to trees and shrubs early in the growth season or during the dormant season
• Prune branches to improve plants and prevent access by pest to structures
• Periodically inspect plants for evidence of pest or disease
• Remove susceptible plants if a plant disease recurs and requires too many resources to keep healthy
• Select replacement plants from among the disease resistant types

Pesticide/Herbicide Applications:
(The IPM coordinator must approve applications)
• An appropriate application uses the least toxic and most effective pesticide or herbicide
• Applications should be applied by qualified applicators
• Applications will be applied when occupants are not expected to be present for at least 12 hours or according to the guidelines for the product used. A sign will be posted 48 hours before the application as required.
• Applications will be applied according to label directions
• Proper protective clothing or equipment will be used when applying chemicals.
• Areas will be properly vented after application

Storing Pesticides:
• Pesticide and herbicides will be stored off site or in buildings that are locked and inaccessible to all undesignated personnel.
• The storage area will have adequate ventilation
• Pesticide and herbicides will be stored in separate locations
• Storage facilities will be such that the risk of flooding and contaminating the environment will be minimal.
• The storage area will be free of ignition sources
• All pesticide and herbicides will be stored in their original containers with secure lids.
• If pesticide and herbicides are stored in occupied buildings precautions will be taken to ensure that the air in the storage space has no chance of mixing with the air in the central ventilation system. Containers will be inspected routinely for leaks.

Posting and Notification:
State law has required schools to notify students and staff of impending non-emergency pesticide applications 48 hours in advance. Notices will be posted in the areas to be treated as required by current code at all times.

Evaluation and Recordkeeping:
• Recordkeeping allows the IPM Coordinator to evaluate the IPM Program.
• Copies of the Integrated Pest Management Plan will be kept in the Superintendent's Office and the IPM Coordinator's Office.
• A pest management log will be maintained for the district and kept in the office of the IPM Coordinator. It will include pesticide use records that meet the requirements of the Texas Department of Agriculture.
• A copy of the EPA-registered label and the current SDS for each pesticide and herbicide product used on school property will be kept in the IPM Coordinator's Office.
• The following forms will be filed in the IPM Coordinator's Office:
    • Approval for Yellow and Red List Products
    • Emergency Treatment Request
    • Registration Notification Documentation
    • Pest Management Log

- Incidental Use Letters
- Documentation of Training
- An IPM facility inspection document will be completed on each school campus at least every other year or more frequently based on campus age and pest problems.
- Request/Complaints relating to pest problems
- Contracts and records dealing with professional pest control services

VIII. IPM Plans for common pest problems

The following action plans for common pests in the District have been developed following protocol detailed by the eXtension organization, which is a knowledge-to-action service that is an integral part of the U.S. Cooperative Extension System for extension professionals and the public we serve.

Always read and follow the label. The label is the law. Pesticides must be used in accordance with federal, state and local regulations. Applicators must have proper credentialing to apply pesticides and should always wear personal protective equipment (PPE) as required by the pesticide label during applications. All labels and Safety Data Sheets (SDS) for the pesticide products authorized for use in the IPM program should be maintained on file.

Carpenter Ants:
Monitoring and Inspection:
Carpenter ants forage outside the nest for food and water and are often sighted in infested dwellings around sinks or bathroom fixtures, especially in late winter and spring. Foraging ants can sometimes be followed to locate the nest, which may be outside of the structure. A parent nest is usually located outside the structure with satellite nests located inside. Finding the parent nest outside is recommended to prevent satellite nest formation indoors. Sawdust-like waste piles are telltale signs of nesting activity. An awl, spatula, or screwdriver can be used to probe for damaged wood. Thermal imaging can also be used to locate potential nests within a building.

Nonchemical Control Measures:
A primary defense against carpenter ants is to avoid moisture-damaged wood. Regularly inspect and promptly correct roof, window or vent leaks; clogged, damaged or improperly aligned gutters; or wood that may be in contact with soil or vegetation. Prune trees and shrubs in contact with the structure.
Move firewood piles or other debris away from the structure. Similarly, decaying or softened wood building elements, such as soft decking and window or door sills, should be repaired or replaced.

Sanitation/Cultural Control Measures:
Nonchemical controls include removing infested wood and vacuuming up ants, nests and

debris.

Physical/Mechanical Control Measures:

- Repair any water leaks from roofs, windows, pipes, or other sources.
- Remove tree stumps and landscape timbers adjacent to structures.
- Trim branches touching structures or wires leading to structures.
- Improve ventilation to speed drying in attics, crawlspaces and other enclosed areas.

Chemical Control Measures:
Granular baits and gel baits specifically designed for carpenter ants should be placed in inaccessible areas to reduce the potential for occupant exposure. For greatest impact, baits should be placed near ant trails. Baits may take up to 60 days to eliminate the colony. Replenish baits as needed until ants are no longer present. If ants do not appear to take a given bait, apply a different brand or wait a few weeks and try again.
When the location of a carpenter ant nest is known, insecticides may be applied directly to the nest void. Applications can be made through a natural opening (i.e., frass kick hole) or through a hole made by milling into the suspected nest cavity. Apply small amounts of an insecticide dust or aerosol labeled for indoor use into the nest opening. Where nests cannot be identified with certainty, dusts may be applied to voids reached by removing electrical outlets or switch plate covers, or by drilling holes in walls and sealing after the application.

Broadcast spray applications should be the last option for carpenter ant control. Spray applications to building exteriors, and exposed impervious surfaces including foundations, walkways, and driveways are prone to runoff into surface water and should be avoided unless all other options have failed.

Evaluation Methods:
Carpenter ant activity can be monitored before and after treatment to determine effectiveness of management efforts. Place honey, jelly, sugar in milk, or previously frozen mealworms or crickets on cards/caps around the structure in the evening or late afternoon, where ants have been seen at potential water, food, or nest sites. Leave in place for sufficient time for the ants to find the attractants and count the number of ants at each station. Organized or deliberate carpenter ant activity should cease by six weeks after treatment.

Fire Ants:
Monitoring and Inspection:
Regular visual inspection of school grounds (and adjacent areas) can help to identify ant activity and determine the need for remedial action. However, in regularly infested areas, routine, calendar-based broadcast bait application is often recommended as a more efficient way to reduce ant populations and stings compared to inspecting and treating mounds as they occur. Broadcasting baits may also reduce the overall amount of insecticide applied.

In and around buildings, check all windows and doors for tight seals. Check roof and outside areas for mounds and possible entry points.

Nonchemical Control Measures:
Maintaining thick, healthy turf can reduce the number of southern fire ant mounds present on school and neighboring property. Southern fire ants prefer bare soil with direct sun exposure; however, other fire ant species are not as easily deterred.

Sanitation/Cultural Control Measures:
Regular mowing may knock down mounds and cause mound movement, but probably will not reduce the number of mounds.

Physical/Mechanical Control Measures:
Seal all suspected ant entry points into buildings. Fix or repair door sweeps.

Chemical Control Measures:
Broadcast applications of an Insect Growth Regulator (IGR) bait containing methoprene or pyriproxifen; or non-IGR products containing abamectin, indoxacarb, hydramethylnon or spinosad, can be applied in the spring and fall for continued control. IGR baits may be applied to turfgrass areas during spring or summer vacations. For fast control of problem mounds, apply a non-IGR bait or contact insecticide to mounds. Baits are most effective when fire ants are actively foraging, i.e., when temperatures are between 70 and 90 degrees F. Liquid, granular, dust, or aerosol contact insecticide treatments may be used to eliminate individual mounds.

Surface-applied, slow-acting, long-residual, contact insecticides such as pyrethroids or fipronil where maximum suppression is desired can also be used. Remember to use caution when making these applications and to keep students and staff out of the area until these products have been watered into the soil and the application area has dried.
Faster acting toxicant baits such as hydramethylnon, indoxacarb or spinosad should be applied around colonies or mounds that extend under sidewalks or other pavement areas.
Barrier treatments using contact insecticides around perimeter walls may reduce the number of ants foraging indoors if an immediate problem exists.
Pyrethrum sprays may be applied to ant entry points only in emergency situations where fast control is needed and caulking or sealing is not possible.

Evaluation Methods:
IGR baits generally take up to eight weeks before control can be seen. Faster acting toxicant baits generally will net results in several days to several weeks. The most effective fire ant management program is based on a proactive approach to prevent infestation rather than a reactive one once you have a problem.

German Cockroaches:
Monitoring and Inspection:
The number one monitoring tool for cockroaches is an adhesive-coated, cardboard insect monitoring trap, also known as "sticky traps". Some sticky traps have a German cockroach aggregation pheromone and are effective in attracting roaches to the monitor. The pheromone traps are effective with low populations and detecting new infestations. These inexpensive devices should be placed in pest vulnerable areas including food storerooms and preparation areas, and anywhere else cockroaches have been a problem including laundry rooms, custodial closets, electrical closets, storage closets, staff lounges, and student stores. Insect monitors are exceptional in detecting cockroaches but also in indicating direction of travel, species present, and whether immatures as well as adults are present.

Inspection practices should include checking for unsealed openings such as missing or loose pipe and conduit escutcheon plates, unsealed edges around sinks and cabinets, unsealed edges of bulletin boards or wall-mounted electrical panels, mirrors, light fixtures, fire alarms or emergency lighting. Inspections should focus on areas where food and water are present including food storage, kitchens, food-serving lines, cafeterias, locker rooms, and staff lounges.

1. Monitoring stations or units should always be dated to monitor activity over time.
2. Be sure to place enough monitoring units to accurately monitor an area because monitors provide valuable information about pest activity. Food service areas should have more monitors than nonfood areas.
3. If a trap is consistently empty, the trap may be relocated to another site.
4. Create a map of the area that includes the location of the traps. You may also leave space on your map to write numbers of insects per trap for each inspection. It may be helpful to use monitor locators such as stickers.
5. Monitors should be placed along walls or in corners.
6. Monitors should be kept out of view if possible. Monitors may be secured with double sided tape.
7. They should be placed in clean, dry areas close to suspected cockroach harborage.
8. If possible, monitors should be placed in between resources (harborage, food, and water) where cockroaches may travel.
9. Monitors should be replaced if full or if the monitor has been wet or is covered in dust.
10. Monitor placement is critical and they should be placed along structural lines, adjacent to walls, corners etc., where roaches travel.

Nonchemical Control Measures:
Cultural and mechanical management options are preferred. This includes prompt clean-up of spills, proper food storage and waste handling, preventing access to water by fixing plumbing leaks, eliminating harborage and access to the building by sealing cracks and crevices, removing products from cardboard shipping containers before shelving, and inspecting incoming product and rejecting any containing cockroaches, cockroach

droppings or egg cases.

Sanitation/Cultural Control Measures:

- Remove individual cockroaches using a vacuum or wipe.
- Use a flushing agent, such as compressed air, or a heat gun directed into cracks and crevices harboring cockroaches and vacuum up cockroaches as they emerge.
- Eliminate the harborage by sealing cracks, sealing edges around wall-mounted electrical panels, light fixtures, bulletin boards, posters, sinks, cabinets, etc. Clean up food and drink spills immediately.
- Inspect incoming products for cockroaches, droppings, or egg cases and reject infested products.
- Follow up with suppliers who deliver infested products and change suppliers if the problem is not resolved. Store food items in sealed containers.
- Place exterior trash cans and dumpsters away from building entrances. Clean drains, cracks, and crevices with an enzyme-based cleaner.

Physical/Mechanical Control Measures:

- Caulk and seal potential harborages around water and food prep sites. Clean on a schedule, including less accessible areas.
- Use a HEPA vacuum to remove heavy infestations prior to treatment
- Remove food products and food service supplies from cardboard containers as soon as they are delivered and put cardboard in outdoor recycling containers to avoid introducing cockroaches and egg cases.
- Use liners for waste containers and empty at the end of the day so that food and food waste is not left in the building overnight. Fix plumbing leaks, gutters that hold water and damp wood to eliminate access to water.
- Position exterior lighting to avoid attracting cockroaches to building entryways at night. Use sodium vapor or yellow bulbs for exterior lighting to reduce attraction to cockroaches.
- Store classroom and art supplies in sealed containers - avoid cardboard for storage of food items like beans and macaroni used as art supplies or snacks. Cockroaches thrive in cardboard.
- Remove clutter.

Chemical Control Measures:
Chemical management options that reduce potential for exposure include insecticide baits in:

- Pre-manufactured, enclosed bait stations
- Gel, liquid, or dry flowable baits placed in cracks and crevices

Insect growth regulator (IGR) applied to harborage areas or in a "point source" delivery system will prevent the proper development of immature cockroaches so they cannot

reproduce as adults. Insect growth regulators used in conjunction with baits are highly effective because gravid (pregnant) female cockroaches eat more when exposed to IGRs, so more bait will be consumed.

Boric acid dusts applied to dry, inaccessible void areas may also provide some control. Care should be taken when applying any kind of dust so that it does not become airborne.
Where cockroach infestation levels are extremely high, aggressive treatment may include all previously mentioned actions plus the targeted application of a liquid residual to known harborage areas. Itis important to note that using a repellent liquid in an area where bait may be applied will render the bait ineffective because the repellent treatment will contaminate the bait and cockroaches will not consume it. Some baits work as quickly as liquids do, particularly with some cockroach populations that have developed insecticide resistance to many liquid spray products, so it is critical to evaluate the effectiveness of the treatment after it is complete.
Chemical options, including baits, should NOT be used on a routine or calendar-based schedule but only where cockroach presence has been confirmed and non-chemical measures are also implemented.

Evaluation Methods:
Once sticky trap monitoring has been introduced into the IPM program, traps should be monitored on a monthly basis and use should be re-evaluated after six months or more. Additionally, for German cockroach infestations, baits and gel applications should be monitored after the first two weeks to see if bait has been taken by the roaches. Then, every two weeks until trap numbers are reduced to zero with no nymphs or egg cases being reported, then bait can be withdrawn from area and monitoring can resume.

Head Lice:
Head Lice treatment falls under the jurisdiction of the campus nurse, but is included here for information purposes as it is a common inquiry.
Monitoring and Inspection:
Head lice spread principally from person to person. It is important to note that head lice are not associated with uncleanliness. Children, however, should be encouraged not to share combs, hats, head-phones, ear-buds, blue-tooth devises or other personal belongings. Periodic inspections aid in early detection of head lice. Early detection will prevent advanced infestations which are much more difficult to control. Children are best inspected during the early weeks of school (August - November) since outbreaks are most common during this time. For this reason, September is "National Head Lice Prevention Month".

An adult louse can move 6 to 30 cm per minute. They are hard to see and very difficult to remove. Nits are easier to spot, especially at the nape of the neck or behind the ears. Unhatched eggs will be within 1cm of the scalp. In general, nits found more than 1cm from the scalp are unlikely to be viable. In warmer climates however, viable nits can occur farther from the scalp.
The presence of active, living lice in a student's head is the only definitive indication of an

infestation that should trigger a head treatment. If an active infestation is noted, the child's parent or guardian should be notified immediately by the school nurse. Treatment options may be suggested. Other members of the family should inspect each other along with children who regularly sleep-over or share hair apparel (hair clips, head-sets, hats, etc.). Parents and school nurses should be encouraged to recheck the student's head for lice after treatments have occurred if the child is still showing signs of infestation.

Nonchemical Control Measures:
Due to the short time period that head lice can survive off the head, transmission occurs most commonly with head-to-head contact, which should be avoided. To further reduce potential for transmission - discourage sharing of combs, brushes, headbands, barrettes, pillows, hats, scarves, coats, helmets, backpacks, or other objects that may come in contact with the head. Where possible place hats, scarves, and coats on widely spaced hooks or in separate lockers or cubbies to avoid contact. If hooks are shared or clustered, have children place their coats and hats in sealed plastic bags, especially if head lice are present. Hats and scarves can also be stored inside backpacks.

Sanitation/Cultural Control Measures:
During outbreaks of head lice, in addition to stressing the preventative measures mentioned above, it is also useful for students to bag their hats and coats between use or keep them in personal lockers or at their chairs. Though head lice do not survive long away from their human host, they can crawl short distances, say, from one hat to another on a hat rack. Bean bag chairs, nap mats or other stuffed furniture that children share should be removed from classrooms during outbreaks. Sharing of sports helmets and audio headphones can also contribute to the spread of head lice among students. Pesticides applied to classrooms, lockers or buses are ineffective, unnecessary and can be harmful to students and teachers.

Physical/Mechanical Control Measures:
Once an infestation is detected through inspection, all clothes should be washed in soapy water and dried on high heat. Pillow cases, sheets, blankets and other bedding material should also be washed and placed in the clothes dryer on the "high heat" cycle for at least 20 minutes to kill the lice and their eggs. Carpets, furniture, car seats and any non-washable items such as children's toys should be thoroughly vacuumed and the vacuum bag immediately discarded outside of the home. The risk of getting infested by a louse that has fallen onto carpet is very low according to the CDC (https://www.cdc.gov/parasites/lice/head/prevent.html), but vacuuming may help ensure it is not transferred before it dies for lack of a host. Anything that cannot be vacuumed may be tightly sealed in plastic bags for at least 7-10 days and placed in a bright sunny area. This elevates the temperature in the bag and kills all stages of the lice.

Chemical Control Measures:
Because of the biology of the head louse and its increasing resistance to available lice-killing (pediculicide) shampoos, relying on these products alone is not likely to be effective.

An integrated approach including the preventative measures mentioned above, regular head inspections by school nurses, advisories encouraging parents to do daily head checks, manual lice removal with special louse and nit combs, and the judicious use of pediculicides is the best approach to managing infestations. Note that efforts to educate both students and their parents about these pests and their control is a crucial part of a good IPM program for head lice.

Always read and follow the label directions on lice-killing shampoos and chemicals very, very carefully. Never deviate from the directions and always wear the appropriate personal protective equipment if you are applying pediculicide shampoos. Improper use can harm people.
Screening for head lice by a school health professional can be useful. Generally, around 30% of school children with nits will also have adult lice. Screening for nits alone is not an accurate way of predicting which students will need head treatments. The presence of active lice in a student's head is the only definitive indication that should trigger a head treatment. If an active infestation is noted, the child's parent or guardian should be notified immediately. Parents and school nurses should be encouraged to recheck the student's head for lice after treatments have occurred if the child still has signs of an infestation.

The American Academy of Pediatrics and the National Association of School Nurses (http://www.nasn.org/Default.aspx?tabid=237) discourage "no nit" policies in schools. See this website for more information - Pediculosis Management in the School Setting (https://www.nasn.org/PolicyAdvocacy/PositionPapersandReports/NASNPositionStatementsFullView/tabid/462/ArticleId/934/Head-Lice-Management-in-the-School-Setting-Revised-2016). Check location regulations since policies vary.
Parents of all students using the room with any child with confirmed head lice should also be notified and provided with basic information including description, signs and symptoms, and strategies to eliminate head lice. The information should include where to go for additional help.

Mosquitoes:
Monitoring, Inspection, and Evaluation Methods:
Integrated Pest Management calls for early detection and good record keeping in order to evaluate the efficacy of a control program. Complaints from staff and students can be one surveillance method. However, this is subjective and can be influenced by heightened awareness, hysteria, or the knowledge that a control activity was conducted.
More objective methods include larval and adult mosquito surveillance.

Larval surveillance is performed by examining likely habitats for larvae and keeping track of the number of larvae found. A sketch or plot plan of the school grounds is helpful in recording locations where surveillance may be needed. Larvae and pupae of common species are found primarily in standing water in artificial containers located around the school building itself. These sources can be inspected and larvae and pupae captured if

present. Tools for this can be a turkey baster or a light-colored ladle (which can be attached to a broom stick for a longer reach). Usually the record includes larvae per dip and the number and location of habitats examined.

Adult surveillance can be performed by trapping or landing count. A landing count involves a volunteer (preferably the same individual each time due to differing attractiveness between individuals) standing still and another counting the number of mosquitoes landing on him/her within a specific time period (1- 5 minutes). Trapping is another method and requires the use of a trap or traps which can be acquired from a biological supply company or homemade. The trap(s) should be set in the same places, for the same amount of time, and in similar weather. For non-experts a propane-based trap can be a better choice, although the costs are higher, because little skill is required to properly set it and it can be run constantly with little maintenance while checked on a regular basis. (It should be noted that traps often attract many more mosquitoes than they capture and should not be set in close proximity to human or equine activity.)

If mosquito-borne diseases are a concern in your area, contact the local mosquito control district or health agency. Adult mosquitoes also may be carefully captured and preserved in between tissues in a small box and then kept frozen for identification by mosquito specialists. State or county public health agencies, or pest control companies in mosquito-prone areas may have specialists on staff.
Some mosquitoes found around marsh habitats are capable of flying many miles, in which case, control may need to be area-wide. If a school is near such sources and intervention is necessary, efforts will have to be coordinated with county or state mosquito abatement authorities. Refer to your state departments of health for updates on medically important mosquito species in your area.

Nonchemical Control Measures:
In general, identification and elimination of mosquito oviposition (egg laying) sites is more effective and less hazardous than attempting to eliminate adults. These sites include any water that stays still, lacks predators (like fish), and lasts for more than a few days. Some examples are: rain barrels, tires, tarps, trash, take-out food containers, storm drains, and clogged roof gutters. The Asian Tiger Mosquito (Aedes albopictus) is especially well adapted to using any small body of water, including bottle caps, cut off fence posts, bamboo ends, and corrngated drain pipe. Elimination of such waters on a weekly basis preempts the emergence of adults. Adults, on the other hand, once flying, are difficult to control without using chemical means. Adult control methods such as traps, "bug-zappers," etc. may not effectively reduce mosquito populations. Exclusion of mosquito adults from buildings is more feasible and can be accomplished with screens, closed doors, and fans. Keep in mind that during warm weather, mosquitoes can breed in any water that lasts more than four to seven days, depending on the temperature.

Sanitation/Cultural Control Measures:

- Identify anything outside that can hold water such as plastic bottles, cans,

containers, and such. Dispose of items, turn containers over, drill holes in containers or dump out water weekly.

- Turn over wheelbarrows and other water-holding tools when not in use.
- Do not allow water to become stagnate in birdbaths, ornamental pools or other outside areas.
- Regularly inspect and clean out gutters and drainpipes.
- Cover dumpsters, trash and recycling receptacles to prevent water accumulation.
- Be aware of nearby piles of used tires, which have become important mosquito oviposition sites. Remove old tires or have holes drilled in them to drain water.
- Eliminate adult resting sites (tall grass, brush, pines, and other vegetation).
- Cut back or remove dense brush and other vegetation from around buildings.
- Keep grassy areas mowed.
- Promote natural breezes to discourage mosquito occurrence.
- Alter landscaping to eliminate standing water.
- Angle corrugated drain pipes to allow total drainage.

Physical/Mechanical Control Measures:

- Make sure window and door screens are in good repair
- Place fans at doorways if mosquitoes are still entering buildings
- Netting/screening for beds, porches, and open door areas.

Advise students and staff about avoidance tactics, which can include:

- Wear long pants and long sleeved shirts to avoid bites. Avoid areas where mosquitoes tend to concentrate.
- Avoid wearing dark colors. Some mosquitoes and other biting flies are attracted to dark greens, browns and black. They are less attracted to light-colored clothing, especially whites and yellows.
- Using repellents (http://npic.orst.edu/repel.html)

Biological Control Measures:
Biological organisms used to control mosquitoes include predators of larvae and adult mosquitoes, or formulations of naturally occurring mosquito parasites or diseases. The latter are registered by EPA as pesticides and are covered in the next section.

Fish: Many naturally-occurring fish are predators of mosquito larvae. Fish of almost any kind will eat mosquito larvae, including goldfish. The killifish species Gambusia holbmoki and G. affinis (Cyprinodontidae) are native to southern and eastern US and have been used quite successfully for larval control in many situations. However, when translocated to new environments, these fish may compete unfavorably with local fish and other aquatic species. Thus, Gambusia spp. should be used selectively in self-contained water bodies that are not fed or drained by natural waterways. Self-contained waters can include ornamental ponds, abandoned pools, minepits, livestock waterers, fountains or large birdbaths. Releasing Gambusia into waterways is illegal in some states.

Bats and Insectivorous Birds May Not Be the Solution: While predators of adult mosquitoes such as bats can be encouraged, only certain species eat mosquitoes and even these bats are opportunistic feeders and so will feed on many insects and may not have a noticeable impact. Bats do however eat many pests of ornamental and crop plants and are still quite beneficial. Purple martins and bluebirds feed during the day and rarely feed on mosquitoes (they will also readily feed on dragonflies, which are voracious mosquito predators).

Chemical Control Measures:
Many states have laws governing the use of both chemical and biological pesticides in and around schools or other specific environments. This is particularly true in the case of mosquito control, which may involve applications of pesticides to natural bodies of water and thus may pose environmental hazards, and be regulated or managed under federal, state and local ordinances. It is important to be informed about these factors prior to using pesticide options.

Repellents: If students will be in areas of high mosquito activity, advise parents of this fact so that precautions can be taken. Insect repellents are considered to be pesticides by the EPA and as such, are not appropriate for application by staff to students. However, school district policy can direct how repellents can be used on school property, consult with your local health authority for any type of restrictions in your area. The National Pesticide Information Center has good research-based information on repellents (http://npic.orst.edu/ingred/ptype/repel.html).

Pesticides:
Larvicides (which target mosquito larvae) are typically more effective and target-specific than adulticides (which target mosquito adults). Habitat modification is more permanent and preferred to pesticide use where possible. Larvicides include bacteria specific to mosquito and aquatic fly larvae (bacillus sphaericus or bacillus thuringiensis israelensis) insect growth regulators [IGR's] (methoprene), organophosphates, and chitin synthesis inhibitors. Other larvicides include several non- petroleum oils and monomolecular films. Most control can be accomplished with bacterial, IGR, or oil based insecticides.
The timing of larvicide applications depends on the product. Bacterial toxins must be consumed by the larvae and are usually applied well before the fourth molt, while they are still "wigglers." IGRs must also be applied before the pupae stage to upset the molting process. Chitin synthesis inhibitors are effective throughout the entire larval life cycle. These products are usually in pellet or dunk form. The dunks can be applied by hand, while the pellets can easily be distributed with a hand crank seeder/fertilizer. A new technique for applying liquid bacterial toxins and IGR's is to use a fog producing apparatus to distribute the product into numerous containers (such as a dumping ground or tire pile). Monomolecular films prevent the insect from remaining at the surface of the water by reducing surface tension, causing the larvae and pupae to drown. Non-petroleum oils kill larvae and pupae by suffocation. Oils and monomolecular films kill larvae at all stages and can be applied whenever larvae are present

Adulticides are most effective only when the some of the mosquitoes are also addressed. Pesticides targeting mosquito adults can be applied from the ground or air. Pesticides can be applied as a liquid barrier spray or as a fog. Barrier sprays require less specialized equipment and are performed by applying liquid pesticide to resting areas within an area and around the perimeter. These pesticides dry and then kill insects on contact for a few days to a few weeks after application. A barrier spray requires vegetation or other structures around the perimeter in order to effectively defend an area. Care must be taken to avoid flowers for the sake of bees. Fogs are often applied as ultra-low-volume sprays in which small amounts of insecticide are dispersed either by vehicle-mounted equipment or from fixed-wing or rotary aircraft over a large area. Pesticide droplets must contact the mosquito to be effective, so fogging is often done around sunset when mosquitoes are most active. Fogging for mosquitoes is an activity often undertaken primarily by municipality or county agencies, although some larger institutions may have their own programs.

An effective control program will not eliminate all mosquitoes, but will keep the population at a reasonable level and will reduce the risk for mosquito-borne diseases. Most schools are under the umbrella of a local or state run mosquito mitigation program. Often, these are already performing mitigation activities in the area and can complement a school's IPM strategies. They can identify the pest species to help target the correct sources. They know what diseases are prevalent to help determine thresholds. They know what is happening in the surrounding area and can help a school determine if an infestation is self-made or part of a larger problem. They have access to equipment and labs for more effective surveillance and disease testing. They may even contribute supplies or personnel for the effort, freeing up school resources for other priorities.

Rodents:
Monitoring and Inspection:
Rodent problems typically have obvious signs including droppings and pilfered food for mice and rats, and gnaw and grease marks for rats. Grease marks are dark oil stains from rats rubbing against surfaces such as along travel ways, entry points, and corners. These signs are most likely to be found along linear pathways including corners between walls and floors, along the base of foundations, and along pipes or electrical conduits. Rats and mice are more likely to be sighted from dusk through dawn.

Mice typically travel 30 feet or less from nesting sites so an intensive search near droppings or other signs will often uncover the nest in wall voids, cardboard boxes, wooden or plastic pallets, heating units, vending machines, appliances, or kitchen equipment.
Norway rats are known to travel approximately 150 feet if food, water, and harborage are adequate, but they can travel up to a mile if stressed. Norway rat burrows are typically found in existing cavities, softer soil-eroded areas adjacent to masonry or rocks, and where hard surfaces such as sidewalks or foundations meet soil. Entry holes are clean and smooth and may have grease marks on any hard edge. Inactive burrows may be obscured by plant growth, spider webs, or debris.
Roof rats are known to travel up to 300 feet in search of food. Roof rats prefer elevated

nesting sites including attics, walls, roofs, the tops of palms and other trees, and vine-covered fences and walls.
Rats often become active at dusk and can be seen traveling to food or water sources. Rats are active climbers and swimmers.

Physical/Mechanical Control Measure:
These types of nonchemical control measures that include habitat modification, exclusion, and sanitation are effective in eliminating rodent problems. A mouse can squeeze through a hole the size of a pencil diameter. The first line of defense against mouse problems should include sealing up entry holes; cleaning up clutter inside classrooms, storage, and other areas; and storing items off of the floor to allow proper cleaning and inspection. A rat can enter through a1/2-inch gap. Primary IPM strategies for rats are exclusion, keeping exterior trash handling areas clean, and removing or trimming any vegetation that obscures the ground.
Snap traps can be baited with various attractants including food items and cotton string. Peanut butter or honey can be used to stick other foods to the trigger. Snap traps can also be placed in cardboard or plastic boxes designed to hold snap traps. Snap traps should not be used in classrooms unless they are placed in tamper-resistant containers or other areas inaccessible to students. Alternatively, snap traps may be set at night and removed in the morning before students arrive. These should be labeled with a number and marked on a diagram to ensure all are recovered.

Exclusion and Sanitation Mouse and Rat Management Tips

- Seal any openings greater than 1/4 inch in diameter in foundations, walls, fascia, and roofs. Screen vents and install door sweeps to prevent access. If rats are entering through floor drains, seal these with hardware cloth with mesh smaller than 1/2 inch. Install heavy-gauge kick plates at the base of any doors with evidence of rodent gnawing.
- Remove or trim ground cover and other landscape plants to expose ground and discourage rodent travel ways and rat burrowing. Avoid landscaping that creates ideal habitat for burrows including stone walls with unsealed gaps. Remove mulch from building foundations to reduce harborage. Do not allow grass clippings or leaf litter to accumulate adjacent to school buildings.
- Place exterior trash cans and dumpsters away from building entrances to avoid attracting rodents to building. Use exterior trash receptacles with tight-fitting or spring-loaded lids. Use self-contained, leak-proof compactors instead of dumpsters, or at least use dumpsters with tight-fitting lids. Empty exterior trash receptacles daily at the end of each day.
- Fix plumbing leaks and improve drainage to prevent water accumulation near the building. Clean gutters to prevent water retention.
- Remove debris, clutter, or stored materials from the building exterior and adjacent areas to reduce harborage and permit proper cleaning and inspection. Remove clutter and items stored on floors in interior entryways, storage, and other areas to reduce harborage and permit proper cleaning and inspection.

- Place nontoxic monitoring bait blocks in tamper-resistant stations in nonvisible, inaccessible areas and check regularly for feeding.
- Visually inspect vulnerable areas often (e.g., food service, custodial closets, laundry rooms, vending areas, garages, under sinks, sill plates, crawlspaces) for droppings or grease marks. Place glue boards, snap traps, shock traps, or live traps in nonvisible, inaccessible areas to trap rodents. Clean up droppings, grease marks, and urine promptly using water and district-approved disinfectants. Wear proper personal protective equipment during cleanup.
- Fill in inactive burrows with appropriate filler such as mortar for burrows in or under concrete and soil.

Tips for Successful Trapping

- Both roof and Norway rats are leery of new things in their environment, so traps should be in place for several days before being set.
- After being set, traps should remain in place for a week before being moved to a new location.
- Traps should be set along rodent runways to be most effective.
- The trigger side of the trap should be on the wall side.
- Large rodents may move traps so all traps in a school should be secured, even if traps are set on weekends or during holidays.

Tips for Successful Baiting

- Rodent populations may have a food preference. They may be feeding on ketchup packages or only on bread. If that is the case, you may use those items for bait.
- Roof rats generally prefer fruit and nuts.
- Norway rats prefer fish (sardines) or meat.
- Other baits include chocolate or dry oatmeal.
- Peanut butter should be avoided at schools due to potential peanut allergies.
- Use multiple baits to provide a variety of choices. For instance, set several traps with chocolate, several with fruit, and several with dry oatmeal.
- Bait some traps with cotton balls or a ball of string. Pregnant females will scavenge for these items to make a nest.
- Remember rats are afraid of new objects (neophobic), so be patient when setting traps and baits.

Biological Control Measures:
Outdoors in rural and suburban environments, rodents face many natural enemies including predators such as raptors, coyotes, dogs, and cats. In urban environments, biological control is typically insufficient to suppress outdoor populations which readily move into and adjacent to unprotected structures.

Chemical Control Measures:
When nonchemical measures are inadequate, rodenticides can be used in a manner that

greatly reduces potential for nontarget exposure. Place bait-block formulations on rods in tamper-resistant bait stations that are secured so that they cannot be easily moved, such as attached to permanent masonry or 40-pound concrete blocks.
Pesticide options that increase potential for exposure for students, staff, and other facility users include pelleted formulations used outside of burrows, place packs, and granular' or liquid formulations.

Evaluation Methods:
Because dead and dying rodents can cause odor and fear, monitoring and control devices should he checked on a daily basis.

Cleanup Precautions:
The risk of contact with rodent-associated pathogens and allergens increases when cleaning areas that have been infested with rodents. Maintain good ventilation and avoid stirring up dust. Wetting down the site with an appropriate disinfectant allowing for proper dwell time is recommended for hantavirus prevention. CAUTION: Never use bleach if bird droppings are present because a toxic gas will be produced. Wear the appropriate protective equipment including full-face masks with HEPA filters. For more details, see https://www.cdc.gov/rodents/cleaning/

Yellow jacket Wasps
Monitoring and Inspection:
The objective of a yellow jacket management program should be to reduce human encounters with the wasps, but not to eliminate them from the entire area since they are beneficial predators of insects. The two most productive and least environmentally destructive ways to do this are to modify the habitat to reduce access to food in the vicinity of human activities, and to use physical controls such as trapping and nest removal. Yellow jacket nests can be located in a variety of places including in the ground, in masonry or other wall voids, on the eaves of buildings, on fences or in trees. Ground nests are often in sheltered locations such as under shrubs. In environments where these species occur frequently, a monthly inspection of buildings and grounds for nests during the active season may be warranted, with more frequent inspections during nesting seasons for problem species.

Sting Prevention:
- Keep sweet items covered.
- Bees and wasps, like children, are attracted to sweets. This includes recycle bins and garbage cans that contain soda cans or fruit scraps. Change bin and can liners often and clean them with soap and water regularly.
- It is recommended that all outside garbage cans and recycle bins be covered with a self-closing lid.
- Don 't walk barefooted on the playground.

Sanitation/Cultural Control Measures:
Preventing access to food, water, and shelter is critical to reducing problems with bees, wasps and hornets. Yellow jackets are scavengers and typically become a problem where food and waste handling occurs. Screens on windows and exterior doors, tight-fitting lids on outdoor trash cans, recycling bins and dumpsters and frequent cleaning of these receptacles, and heavy trash can liners that reduce rips and leaks are effective approaches. Nesting sites can be reduced by capping open fence-pipe ends, and by sealing gaps, holes and other openings into voids in walls, doorways, eaves, and roofs.

Physical/Mechanical Control Measures:

- Various types of traps can be used for certain species of yellow jackets. These are typically baited with liquid or dry attractants and allow insects to enter, but not escape. They may be useful for monitoring the types and relative numbers of these species present, and if used in larger numbers, may help to suppress populations. This strategy may be most useful where a problem is caused by insects nesting on an adjacent property you do not own. Competing food sources will reduce the effectiveness of traps. Trapping around a concession stand will reduce the numbers of yellow jackets at the concession stand. Traps should be placed out of reach of children when possible.
- Remove individuals with a vacuum or flyswatter.
- Eliminate harborage areas by sealing openings in exterior surfaces including walls, masonry-steps, bleachers, fences, playground equipment, etc. Clean up food and drink spills immediately.
- Store food items to be consumed outdoors in sealed containers.
- Use strong liners for waste containers and recycle bins that do not rip and create spills.
- Empty outdoor trash cans and recycle bins frequently to prevent overflow, ideally in early afternoon and again at dusk. Use outdoor waste containers with sp1ing-loaded doors and keep dumpster lids closed.
- Place outdoor trash cans, recycle bins and dumpsters away from building entrances.
- Do not plant flowering trees, shrubs or flowers immediately adjacent to building entrances, walkways or playground areas. Fix plumbing leaks, gutters that hold water, etc. to eliminate access to water.
- Fill ground nests with fine, dry sand, preferably after dark.

Chemical Control Measures:
If non-chemical methods alone prove insufficient to solve the problem, then integrating a pesticide into your management program may be warranted. When an insecticide is considered necessary for the control of yellow jackets, the best approach is to confine it to the nest itself. Anyone applying insecticides should use special clothing that protects against the chemical as well as against wasp stings. Insecticides should be applied in the evening or very early morning when children are absent, the wasps are inside the nest, and cooler temperatures reduce insect activity. A number of insecticides are registered for use against yellow jackets, the following are most appropriate for use in schools:

Dusts: Residual dusts can be very effective at controlling nests found in wall voids and underground nests. The extent of wall void nest should be determined by listening for activity behind the wall surface. Once the boundaries of the nest have been determined, holes can be drilled into the wall and an appropriately labeled residual dust can be applied. The subsequent holes can be plugged with steel wool to prevent the wasps' escape. Outdoor ground nests can be similarly controlled by approaching the nest at night and dusting the entrance; this procedure should be followed by plugging the entrance with dusted steel wool.

Silica Aerogel and Pyrethrins: Silica aerogel combined with pyrethrins is an effective insecticidal dust that can be used to destroy an underground nest or a nest in a wall void. Silica aerogel is made from sand and works by absorbing the outer waxy coating on insect bodies. Once this coating is gone, the insects cannot retain water and die of dehydration.

Products with Components That "Freeze" Wasps: Pyrethrins can be used to quickly knock down guard wasps at the nest entrance and to kill yellow jackets in aerial nests when they must be destroyed in the daytime. These aerosol products are designed to project a stream of spray 10 to 20 feet and contain highly evaporative substances that "freeze" or stun the yellow jackets.

Do Not Use Gasoline: Gasoline should never be poured into underground nest holes. This dangerous practice creates a fire hazard, contaminates the soil, and prevents the growth of vegetation for some time. A ground application of gasoline poses greater harm to children and the environment than a yellow jacket nest.

Green Products: Some "green" products may be found as part of EPA's 25(b) exempt list. EPA describes the criteria for 25(b) products as: "Minimum risk pesticides that meet certain criteria are exempt from federal registration under section 25(b) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).” The U.S. Environmental Protection Agency (EPA) does not review or register pesticides that satisfy the 25(b) criteria, though registration is required by most states. For information on minimum risk pesticides in your state, please contact your state's pesticide registration office.

Evaluation Methods:
Inspect and monitor area 24 hours after treatment was made to ensure complete elimination of the colony of yellow jackets.

Other Principles to Consider:
Hang traps to attract yellow jackets in the early spring to attract overwintering females and decrease the potential population. Trapping also works to kill foraging wasps and draws foragers away from areas of high human activity.
Traps designed especially for yellow jacket wasps are available from a variety of sources. Note that some species, such as the southern yellow jacket, are primarily predators and may be less attracted to traps than other scavenger species.

While traps may have some benefit in reducing numbers of foraging wasps, they are not generally effective in eliminating entire yellow jacket wasp colonies.
There are currently no effective, low-impact insecticides for quickly eliminating underground yellow jacket colonies. Pyrethroid insecticides work well and should pose no significant environmental or health risks when applied directly to yellow jacket nests.

Sting Treatment:
Wasps, including yellow jackets, paper wasps, and hornets can sting multiple times while honey bees can only sting once. (Other types of bees usually do not sting, but when they do, should be treated like wasp stings.) Honey bees leave the stinger in the skin via a handy barb. Here is where the treatment difference comes in. Immediately after the sting, the stinger needs to be removed. Attached to the stinger is a poison sac that continues to pump venom into the sting site for several minutes. This stinger should not be pulled out; rather, it should be scraped off. A stiff sheet of paper or a credit card works well for this. A wasp sting does not require scraping.
First, move to a safe location to avoid being stung repeatedly. After you have identified the offending organism and, if needed, removed the stinger, be sure to observe the patient for any signs of allergic reaction. If the patient has a history of allergic reactions, shows signs of severe swelling or has trouble breathing, a physician should be contacted immediately. If the patient shows no signs of distress, the sting area can be soothed by applying a cold pack to reduce swelling. An over-the- counter insect bite and sting product may be applied. Home remedies include applying a paste of baking soda or meat tenderizer and water. An antihistamine may also be given to relieve the itching caused by the sting.

Honey Bees
Monitoring and Inspection:
Stinging insect nests can be located in a variety of places including in the ground, in masonry or other wall voids, on the eaves of buildings, on fences or in trees. In environments where these species occur frequently, a monthly inspection of buildings and grounds for nests during the active season may be warranted, with more frequent inspections during nesting seasons for problem species. Generally, new nests are established in the spring or early summer. This is true for both wasps and honey bees.

Honey bees become defensive when people and animals approach colonies with brood present. In regions where Africanized honey bees are present, specific instructions should be provided for avoiding and responding to attacks. These include a set of guidelines on what to do if bumped or stung by a bee. For example, guidance can include if you find yourself bumped by a bee, stop and cover your head with clothing or at least cover your nose and mouth with your hands, look through your fingers or clothing to see if you can determine where the colony is and move in the opposite direction; if you are stung by a bee carefully run away in a straight line at least the length of a football field, seek shelter in a building or vehicle, and avoid other people unless they are offering you aid.

Swarms of bees occur when a new queen is in transition and searching for a new nest with her colony. Swarms are most common in the spring or early summer. In most cases this swarm is harmless. In most cases you can wait 24 hours to see if the swarm moves on and keep children away from the site. Otherwise, seek removal by qualified individual or company. The IPM Coordinator shall maintain a list of available beekeepers for assistance, with names and phone numbers. Region-specific advice is usually available from local Extension specialists or the Department of Agriculture.

Nonchemical Control Measures:
Anyone taking action against a stinging insect nest or managing traps should take precautions to avoid being stung, including wearing protective gear when appropriate, and remediating colonies at the appropriate time of day. Stinging insect nests that are located in areas where they are unlikely to be disturbed are best left alone. When persistent problems occur, proper identification of the species is essential due to the wide variety of food sources, nesting sites and behaviors of this large group. A good understanding of these characteristics is key to finding effective, long-term solutions.
Education is an important element of stinging insect management. Staff and students should be instructed to report stinging insect nests on school grounds, to avoid wearing strong perfumes or eating or drinking outdoors during problem times of year, and to avoid panic when encountering stinging insects or nests. Many more injuries and deaths from encounters with bees result from panic reactions including running into traffic, etc. than from an insect sting.

Sanitation/Cultural Control Measures

- Remove individuals with a vacuum or flyswatter.
- Eliminate harborage by sealing openings in exterior surfaces including walls, masonry steps, bleachers, fences, playground equipment, etc.
- Clean up food and drink spills immediately.
- Store food items to be consumed outdoors in sealed containers.
- Do not plant flowering trees, shrubs or flowers immediately adjacent to building entrances or walkways.

Physical/Mechanical Control Measures

- Use strong liners for waste containers that do not rip and create spills in dumpsters and trash cans.
- Empty outdoor trash cans frequently to prevent overflow, and ideally in early afternoon and again at dusk.
- Use outdoor waste containers with spring-loaded doors and keep dumpster lids closed.
- Place outdoor trash cans and dumpsters away from building entrances.
- Fix plumbing leaks, gutters that hold water, etc. to eliminate access to water.

Nest Removal
A nest can be destroyed through physical removal (vacuuming) or by using a pesticide (see Chemical Controls). Either way, great care must be exercised because any disturbance around a nest can cause multiple stings. It is best to have a professional pest control operator (PCO) or other experienced person remove the nest. Nest removal should take place at night when the children are out of school and the yellow jackets are inside the nest. When illumination is needed, use a flashlight covered with red acetate film so it will not disturb the wasps. Adequate protective clothing and proper procedure can minimize problems and stings. It is important to wear protective clothing when removing wasp nests. Complete body coverage is essential because yellow jackets and other wasps can find even the smallest exposed area. Use clothing made for beekeepers. This includes:

- A bee veil or hood that either contains its own hat or can be fitted over a light-weight pith helmet or other brimmed hat that holds the veil away from the head. A metal-screen face plate that extends around the head is a desirable feature. Check the veil carefully for tears before each use.
- A bee suit or loose-fitting, heavy-fabric coverall with long sleeves. This is worn over regular pants and a long-sleeved shirt to provide extra protection from stings.
- Sturdy high-topped boots with pant legs secured over the boots with duct tape to prevent wasps from getting into trousers.
- Gloves with extra-long arm coverings so sleeves can be taped over them to protect the wrists.

A more detailed description of the nest removal process is provided at http://www.clemson.edu/extension/beekeepers/fact-sheets-publications/honey-bee-colony-removal.html.

Chemical Control Measures:
A number of low toxicity, effective pesticide options are available for stinging insects, including formulations that can be used in a way that minimizes exposure to non-target organisms. A commercially available wasp and hornet spray for killing the bees and wasps can provide quick knockdown and can be used from a distance, but provides no residual control. Dust formulations of labelled pesticides, including boric acid dusts, may also be pumped onto an enclosed nest. Application of liquid residual pyrethroid sprays can be made to known harborage areas, but it is difficult to get liquids sprays to all of the nest. There is evidence that soapy water is also a very good material (use one cup of liquid soap per gallon of water sprayed or a soapy foam). This is inexpensive and relatively environmentally benign. How the bees are killed will depend on the particular situation.

Evaluation Methods:
For swarming bees - watch for 24 hours, if swarm is still there after 24 hours watch swarm to see if they have established a next close by.
For hive removal ensure that entire colony has been killed or removed, the comb has been removed and cleaned and disinfected.

Snakes

Monitoring and Inspection:

Snakes are often thought of to be pests, when in actuality, they are predators of many common pests and are an important part of a healthy ecosystem and environment because they help control disease. It is recommended that snake presence be managed, but it is also important to recognize that there are no chemicals or fumigants that can be legally used to control snakes. While repellants are available on the market, none have proven effectiveness.

Nonchemical Control Measures:

Avoidance is the most highly recommended nonchemical control measure for snakes. However, it is also recommended that snakes be assumed to be venomous until otherwise confirmed, for safety's sake. Vacate the area of students as soon as possible and contact Maintenance or municipal Animal Control for further assistance if needed for removal or investigation.

Snakes naturally habitat areas with tall grass and debris or leaves. Areas that are commonly used by students or staff can be mowed and extra shrubbery or leafy debris removed to avoid snake nesting. Piling of debris and wood should also be avoided. Proper IPM protocol should help eliminate snake feeding sources, but feeding of birds should also be eliminated in order to limit snakes. Elimination of pooling water or water leaks can also discourage snake nesting. In warming months, be vigilant of sunny areas where snakes may become more active.

Safety:

If suspicion of a bite has occurred, please contact a campus nurse immediately.

<u>Final Note</u>

Many other pests can be managed using the above approaches, however, for assistance, please contact the Operations Department for appropriate Integrated Pest Management response at 972-429-2320. Many strategies used in homes are not allowable in public facilities.

Thanks for your help in keeping our staff happy and healthy through proper IPM practices!