Pest Identification Handbook for Colorado Schools, Childcare Settings & Public Buildings
Colorado School
Pest Identification
Handbook

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Pavement ant: Joseph Berger, Bugwood.org

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# Table of Contents

Introduction................................................... i

**Ants**
Pavement Ant.................................................. 1
Field Ant........................................................ 3
Pharaoh Ant.................................................... 5
Odorous House Ant.......................................... 7
Carpenter Ant.................................................. 9

**Biting Insects**
Bed Bug.......................................................... 11
Head Lice....................................................... 13

**Cockroaches**
German Cockroach........................................... 15
American Cockroach......................................... 17
Oriental Cockroach........................................... 19

**Nuisance Pests**
Boxelder Bug.................................................. 21
Western Conifer Seed Bug................................... 23
Cluster Fly....................................................... 25

**Stinging Insects**
Western Yellow Jacket...................................... 27
European Paper Wasp........................................ 29
Bumble Bee..................................................... 31
Honey Bee....................................................... 33

**Vertebrates**
Deer Mouse................................................... 35
House Mouse.................................................. 37
Rock Pigeon..................................................... 39
Introduction

The *Pest Identification Handbook* is designed to help facility managers and staff easily and quickly recognize common pest problems in Colorado schools, childcare settings and public buildings. It utilizes Integrated Pest Management strategies to treat infestations in an environmentally sensitive and health conscious manner. The program aims to reduce pest populations and pesticide applications.

Included in this handbook are pests common to the region and those documented to be a problem in local schools. Each flashcard includes:

- **Identification:**
  brief description of the pest, including a graphic indicating the actual size of the pest. For convenience, a ruler is included on the back of this publication.

- **Nesting Habits:**
  common nesting locations.

- **Diet:**
  preferred food of the pest.

- **Significance:**
  consequences caused by the pest.

- **IPM Recommendations:**
  brief suggestions on how to handle the pest problem in a healthy and environmentally safe way.
Pavement Ant
*Tetramorium caespitum*

Adult pavement ant (Joseph Berger, Bugwood.org)

Pavement ant infestation (Joseph Berger, Bugwood.org)

Pavement ant mounds at the entry of nests (securitypest.com)
Pavement Ant
Tetramorium caespitum

Identification
- light to dark brown in color with fine grooves lining the head
- appendages (legs and antennae) lighter in color than the rest of the body

Nesting Habits
- characteristically produce small mounds at the entry of nests
- nests often located outdoors under stones, pavement, wood, next to buildings and under building foundations
- enter homes through cracks in concrete, and nest in walls, under floors and around sinks

Diet
- prefer greasy materials such as meats, pet food, sweets, bread, nuts and insects

Significance
- contaminate sweets (sugar, fruits, syrups, etc.) and greasy foods

IPM Recommendations
- Locate and destroy nests.
- Store food in airtight containers, and dispose of trash regularly.
- Seal potential ant entryways.

Additional information available at:
http://www.ext.colostate.edu/pubs/insect/05518.html
http://www.extension.umn.edu/distribution/housingandclothing/m1166.html
Field ants collecting honeydew-like material secreted by peony bud (Whitney Cranshaw, Colorado State University, Bugwood.org)

Adult field ant feeding on honey (Joseph Berger, Bugwood.org)

Field ant identification (University of Nebraska-Lincoln, UNL Extension)

Field Ant
*Formica sp.*

Ants 3
Field Ant
*Formica sp.*

**Identification**
- black or reddish brown and black
- most common ants found in yards and gardens
- often mistaken for carpenter ants, but not as likely to forage indoors (observed indoors most commonly in spring)

**Nesting Habits**
- nest outdoors in loose soil
- produce mounds (sometimes incorporating twigs, dried leaves and other plant materials) in exposed areas

**Diet**
- a variety of foods
- prefer sweet materials such as honeydew excreted by aphids and other insects

**Significance**
- become a nuisance during swarming flights

**IPM Recommendations**
- Seal potential ant entryways.
- Store food in airtight containers, and dispose of trash regularly.
- Locate and destroy nests in lawn and adjacent areas.

**Additional information available at:**
http://www.ext.colostate.edu/pubs/insect/05518.html
http://www.extension.umn.edu/distribution/housingandclothing/m1166.html
Pharaoh ants may travel from room to room on electrical wires. (Jim Kalisch, UNL Entomology)

Pharaoh ant colony
(Catina Ratliff, Purdue University Entomology)

Pharaoh ant
(Max Badgley, UC IPM Online)

Pharaoh Ant
*Monomorium pharaonis*
Pharaoh Ant
Monomorium pharaonis

Identification
• golden yellow to red with darker markings down the back

Nesting Habits
• wide variety of secluded places in cracks and crevices (countertops, baseboards, wall voids, under floors)
• prefer a warm and humid environment (e.g. near furnaces, hot water pipes and heat ducts)
• more likely to nest indoors than other ants

Diet
• syrups, jellies, grease, cake, pet food, dead insects, toothpaste, soap and several other things most insects would not touch

Significance
• contaminate sweets and greases
• serious pest of dormitories, hospitals, schools and apartments

IPM Recommendations
• Control may be hard because nests can be difficult to find and there may be multiple nesting sites in the building.
• Use a bait specific to the pharaoh ant.

Additional information available at:
http://www.ext.colostate.edu/pubs/insect/05518.html
http://www.extension.umn.edu/distribution/housingandclothing/m1166.html
Odorous house ant identification
(University of Nebraska, Lincoln)

Adult odorous house ant
(Joseph Berger, Bugwood.org)

Odorous house ant trail
(Pinto & Associates)

Odorous House Ant
*Tapinoma sessile*

Ants
Odorous House Ant
Tapinoma sessile

Identification
• dark brown to black
• emit an odor similar to coconuts when disturbed or smashed

Nesting Habits
• outdoors—nest in mulch next to buildings and in soil under protection
• indoors—nest in walls and under carpet, usually near water pipes

Diet
• insects and sweets, especially honeydew excreted by aphids and other insects
• forage indoors for sweets, cooked vegetables, fruit and pastries

Significance
• contaminate foods such as sweets, meats, dairy products and vegetables

IPM Recommendations
• Locate and destroy all nests to avoid reinestation (follow ants back from their food source).
• Clean ant trails with soap and water.
• Trim shrubbery and trees away from buildings.
• Store food in airtight containers, and dispose of trash regularly.
• Seal potential ant entryways.
• Use a bait specific to the odorous house ant.

Additional information available at:
http://www.ext.colostate.edu/pubs/insect/05518.html
http://www.extension.umn.edu/distribution/housingandclothing/m1166.html
Damage to wood caused by the carpenter ant’s nesting habits
(R. Werner, USDA Forest Service, Bugwood.org)

Wood shavings are a sign of the carpenter ant
(Edward H. Holsten, USDA Forest Service, Bugwood.org)

Adult carpenter ant
(Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org)

Wood shavings are a sign of the carpenter ant
(Edward H. Holsten, USDA Forest Service, Bugwood.org)

Damage to wood caused by the carpenter ant’s nesting habits
(R. Werner, USDA Forest Service, Bugwood.org)

Carpenter Ant
*Camponotus sp.*

Ants
Carpenter Ant
Camponotus sp.

Identification
- black or black with a reddish brown body
- abdomen covered in yellowish hairs

Nesting Habits
- establish nests in wood (especially decaying wood)
- foragers—they go out in search of nutrients but return to the outdoor nest

Diet
- living and dead insects, meats, and sweets, such as jelly, honey and honeydew excreted by aphids and other insects
- DO NOT eat wood but remove it to create galleries and tunnels

Significance
- damage wood, infest food and may bite

IPM Recommendations
- Remove and replace water-damaged or decaying wood.
- Seal potential ant entryways.
- Remove food and water sources.
- Locate and destroy indoor nests to avoid reinfestation.

Additional information available at:
http://www.ext.colostate.edu/pubs/insect/05518.html
http://www.ext.colostate.edu/pubs/insect/05554.html
http://lancaster.unl.edu/pest/resources/carpant004.shtml
Bed Bug

*Cimex lectularius*

Biting Insects

11
Biting Insects

Bed Bug

*Cimex lectularius*

**Identification**
- straw-colored to reddish-brown; may appear dark red in color after feeding
- oval-shaped, relatively flat bodies covered with short, golden hairs

**Nesting Habits**
- rest in crevices and cracks near or on furniture

**Diet**
- blood from a variety of animals, but prefer humans
- feed for about 10 minutes at night before retreating back to a sheltered crevice to digest the meal

**Significance**
- not known to transmit disease to humans, but are difficult and costly to eliminate
- bites result in redness, itching and swelling at the site, but reactions are variable
- infestations can cause sleeplessness and nervousness in those who have been bitten

**IPM Recommendations**
- Inspect and monitor areas with upholstered furniture as well as donations, lost and found items, and children's belongings.
- Remove clutter.
- Seal cracks and crevices.
- Spraying alone is not recommended.
- If bed bugs are suspected, collect a sample and contact an expert.

Additional information available at:
http://www.ext.colostate.edu/pubs/insect/05574.html
Head lice use their claws to cling to hairs (Alabama School IPM).

**Head Lice**

*Pediculus humanus capitis*

Biting Insects
Identification
- adults—small, rust-colored insect about the $\frac{1}{8}$ in size of a sesame seed
- eggs (nits)—resemble dandruff flakes both in appearance and size

Nesting Habits
- hold on to hair above ears and near neckline with claw-like legs
- spread by direct contact with infested persons or belongings

Diet
- feed by piercing skin with claws and sucking out blood

Significance
- bites result in small, red, itchy bumps on scalp and shoulders

IPM Recommendations
- Perform inspections often, especially when other children are known to have lice.
- Encourage children NOT to share brushes, combs, hats, barrettes, towels and bedding.
- Clean carpets and furniture in classrooms frequently.
- Be aware of medical and privacy issues. Consult your school nurse.

Additional information available at:
- http://coloradoipmcenter.agsci.colostate.edu/
German Cockroach
*Blattella germanica*

Adult German cockroach
(Clemson University - USDA Cooperative Extension, Bugwood.org)

Adults are about ½ inch long
(Clemson University - USDA Cooperative Extension, Bugwood.org)

German cockroach egg case
(Gary Alpert, Harvard University, Bugwood.org)

Cockroaches
German Cockroach
*Blattella germanica*

**Identification**
- light brown with two dark strips right behind the head

**Nesting Habits**
- prefer warm, moist areas near food preparation and/or storage
- found near kitchen and bathroom sinks, appliances and furnaces

**Diet**
- very adaptable diet (glue, toothpaste and soap)

**Significance**
- may carry pathogens on their bodies; spread food contaminates; and cause allergic reactions, similar to asthma, in some sensitive people

**IPM Recommendations**
- Dispose of trash regularly to remove food and shelter sources.
- Repair any leaks or plumbing malfunctions because cockroaches are attracted to water sources and damp environments.
- Store food in pest-safe containers.
- Caulk and install weather stripping where cockroaches can potentially enter the building.
- Use cockroach baits to monitor populations.

**Additional information available at:**
http://www.ext.colostate.edu/pubs/insect/05553.html
http://insects.tamu.edu/fieldguide/aimg25.html
http://ag.arizona.edu/urbanipm/buglist/cockroaches.pdf
American Cockroach

*Periplaneta americana*

Cockroaches 17
American Cockroach
*Periplaneta americana*

**Identification**
- reddish-brown colored with a yellow border around the head
- largest species commonly found in Colorado schools

**Nesting Habits**
- moves indoors during hot weather and flooding
- found in warm, moist areas—under sinks, in bathtubs, in sewer drains and in furnace and boiler rooms

**Diet**
- almost anything but mostly eats decaying vegetation, insect remains and sweets

**Significance**
- may carry disease pathogens and excrete a foul smelling odor
- cause allergic reactions, similar to asthma, in some people

**IPM Recommendations**
- Dispose of trash regularly to remove food and shelter sources.
- Repair any leaks or plumbing malfunctions because cockroaches are attracted to damp environments.
- Caulk and install weather stripping where cockroaches can potentially enter the building.

**Additional information available at:**
http://www.ext.colostate.edu/pubs/insect/05553.html
http://ag.arizona.edu/urbanipm/buglist/cockroaches.pdf
http://entnemdept.ufl.edu/creatures/urban/roaches/american_cockroach.htm
Oriental cockroach
(Clemson University - USDA Cooperative Extension, Bugwood.org)

Oriental egg case and nymph
(Paul M. Choate, University of Florida)

Group of Oriental cockroaches
(roachforum.com)

Oriental Cockroach
*Blatta orientalis*

Cockroaches 19
Cockroaches

Oriental Cockroach
*Blatta orientalis*

**Identification**
- dark brown to black with wings that are not as long as the body 1¼ in

**Nesting Habits**
- often found in basements, cellars, crawl spaces and sewers; or near drains, leaky pipes and faucets, and under refrigerators and sinks
- also referred to as “water bugs” because they can be found in cool, damp, dark areas
- infestations common in spring and fall

**Diet**
- garbage and decaying organic material

**Significance**
- may carry pathogens on their bodies; spread food contaminates; and cause allergic reactions, similar to asthma, in some sensitive people
- emit strong odor

**IPM Recommendations**
- Repair any leaks or plumbing malfunctions because cockroaches are attracted to water sources and damp environments.
- Store food in pest-safe containers.
- Caulk and install weather stripping where cockroaches can potentially enter the building.
- Use cockroach baits to monitor populations.

**Additional information available at:**
- http://www.ext.colostate.edu/pubs/insect/05553.html
- http://ento.psu.edu/extension/factsheets/oriental-cockroaches
- http://www.extension.umn.edu/distribution/housingandclothing/dk1003.html
Boxelder Bug
*Boisea trivittata*

**Adult boxelder bugs**
(Whitney Cranshaw, Colorado State University, Bugwood.org)

**Adult and nymph boxelder bugs**
(William M. Ciesla, Forest Health Management International, Bugwood.org)

**Boxelder bug eggs**
(Whitney Cranshaw, Colorado State University, Bugwood.org)

*Nuisance Pests*
Boxelder Bug
*Boisea trivittata*

**Identification**
- black bugs with red markings on body
- immature forms are smaller, but easily distinguished from the adults by their lack of wings and red abdomens

**Nesting Habits**
- found in and around homes from fall through early spring
- only a nuisance when there is a female boxelder tree in the area

**Diet**
- a variety of plants, but prefer boxelder seed pods, which are only found on female boxelder trees

**Significance**
- crawl on the exterior and interior of buildings, may stain lightly colored materials, and emit an unpleasant odor when smashed

**IPM Recommendations**
- Remove female boxelder trees in the area if possible.
- Seal cracks that may allow boxelder bugs to enter buildings.
- Use a vacuum cleaner to remove indoor populations.

Additional information available at:
http://coloradoipmcenter.agsci.colostate.edu/
http://www.ext.colostate.edu/pubs/insect/05522.html
Western conifer seed bug nymphs
(Sandy Kegley, USDA Forest Service, Bugwood.org)

Western Conifer Seed Bug
*Leptoglossus occidentalis*

Adult western conifer seed bug (David Cappaert, Michigan State University, Bugwood.org)

Adult western conifer seed bug (Whitney Cranshaw, Colorado State University, Bugwood.org)

Nuisance Pests
Identification
- fairly large (5/8 to 3/4 inch long)
- hind legs have a leaf-like expansion
- strong flying pattern; may produce a loud buzz

Nesting Habits
- adults spend the winter in sheltered area
- one generation per year

Diet
- primarily seeds of various trees and shrubs, with a preference for pine

Significance
- frequently move into nearby homes to overwinter
- do not damage household items, bite, feed or reproduce in the home
- may reduce the quality and viability of conifer seed crops

IPM Recommendations
- Seal exterior openings in late summer and early fall.
- Screen fireplace chimneys and attic and wall vents.
- Vacuum and dispose of individual insects found in the home.

Additional information available at:
http://www.ext.colostate.edu/pubs/insect/05588.html
http://www.ipm.iastate.edu/ipm/iiin/pineseedbug.html
Cluster Fly

*Pollenia* spp.

Nuisance Pests
Identification
- slightly larger than house fly
dull, grayish-brown
- crinkly golden hairs on the thorax
- slow moving

Nesting Habits
- adult flies lay eggs in soil and the maggots move to and develop within earthworms
- as many as 4 generations per growing season
- do NOT lay eggs in human food (no health hazard to people)

Diet
- larvae (maggots) develop as parasites of earthworms
- not associated with garbage or animal wastes
- adults feed on flower nectar

Significance
- adults seek sheltered areas to overwinter such as crevices and cavities in buildings in late summer and early fall
- may become active during warm periods of winter

IPM Recommendations
- Caulk and seal all exterior openings on a building.
- Dessicant dusts may kill flies behind walls.
- Vacuum or use a fly swatter.

Additional information available at:
http://www.ext.colostate.edu/pubs/insect/05502.html
http://www.ipm.iastate.edu/ipm/iiin/atticf.html
Western Yellow Jacket

*Vespula pensylvanica*

Stinging Insects

27
Western Yellow Jacket
*Vespula pensylvanica*

Identification
- banded yellow or orange and black
- sometimes mistaken for honey bees, but lack the hairy body and are more intensely colored

Nesting Habits
- paper comb with surrounding envelope
- underground using existing hollows, such as those in children’s playground equipment

Diet
- insects, spiders, meats and sweets
- scavenge around dumpsters and trash containers

Significance
- the most important stinging insect in Colorado
- sting can cause an allergic reaction in some individuals

IPM Recommendations
- Reduce nesting sites before early spring.
- Eliminate all food sources such as open garbage cans that provide food and moisture.
- Use baits and traps for control of yellow jackets in June and early July.
- If active nests are causing problems, destroy the nest with an insecticide labeled for wasps during late evening or cool periods in early morning.

Additional information available at:
- http://coloradoipmcenter.agsci.colostate.edu/
- http://www.ext.colostate.edu/pubs/insect/05525.html
- www.epa.gov/pesticides/ipm
Wasps nest in hollow tubing, such as that found in playground structures (Whitney Cranshaw, Colorado State University, Bugwood.org).

Adult European paper wasp (Whitney Cranshaw, Colorado State University, Bugwood.org).

Paper wasp nest (Joseph Berger, Bugwood.org).

European Paper Wasp
Polistes dominula

Stinging Insects 29
European Paper Wasp
Polistes dominula

Identification
• generally black in color and marked with yellow
• distinct constriction of the body between the thorax and abdomen
• the long hind legs of paper wasps tend to trail below when in flight

Nesting Habits
• paper comb, no surrounding envelope
• attached to wood on the underside of porch decks, eaves or other overhangs, and in dark cavities

Diet
• predators of caterpillars and other small insects
• sugary foods

Significance
• inflict painful stings, but relatively non-aggressive
• sting can cause an allergic reaction in some individuals

IPM Recommendations
• Reduce nesting sites before early spring.
• Eliminate food and water sources.
• European paper wasps can be encouraged to nest in nest boxes.
• If active nests are causing problems, destroy the nest with an insecticide labeled for wasps during late evening or cool periods in early morning.

Additional information available at:
http://coloradoipmcenter.agsci.colostate.edu/
http://www.ext.colostate.edu/pubs/insect/05525.html
www.epa.gov/pesticides/ipm
Bumble bee queen
(Cranshaw. W.S., Nuisance Wasps and Bees)

Bumble bee pollinating flowers
(Karan A. Rawlins, University of Georgia, Bugwood.org)

Adult bumble bee on zinnia
(Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org)

Bumble Bee
*Bombus sp.*

Stinging Insects
Bumble Bee
Bombus sp.

Identification
- banded with orange or yellow and black
- heavy-bodied and quite hairy

Nesting Habits
- build nests in existing cavities such as abandoned rodent burrows
- nest in many cavities, especially those with insulation
- prefer meadows, fields, parks and gardens
- unlike honey bees, their nests last for only one season

Diet
- nectar and pollen from flowers

Significance
- can sting more than once, but generally non-aggressive unless the nest is disturbed

IPM Recommendations
- Bumble bees are beneficial insects and important pollinator and should not be destroyed unless they pose a threat.
- Assess the plant life in the vicinity to determine if there are any attractants. Planting changes may be warranted if bumble bees become a problem.

Additional information available at:
http://coloradoipmcenter.agsci.colostate.edu/
http://www.ext.colostate.edu/pubs/insect/05525.html
Honey Bee
Apis mellifera

Stinging Insects
Honey Bee
Apis mellifera

Identification
- black or brown intermixed with yellow
- bodies covered with hairs
- pollen sacs on hind legs

Nesting Habits
- cavities such as hollowed-out trees or wall voids
- consist of honeycombs

Diet
- nectar and pollen from flowers

Significance
- sting can cause an allergic reaction in some individuals
- nests can destroy structure walls

IPM Recommendations
- Honey bees are beneficial insects and should not be destroyed unless they pose a threat.
- Assess the plant life in the vicinity to determine if there are any attractants. Planting changes may be warranted if honey bees become a problem.
- If a hive is present inside a wall void, contact your local beekeeper’s association or a licensed expert.

Additional information available at:
http://coloradoipmcenter.agsci.colostate.edu/
http://www.ext.colostate.edu/pubs/insect/05525.html
Deer Mouse
Peromyscus maniculatus

Vertebrates
Vertebrates

Deer Mouse

*Peromyscus maniculatus*

**Identification**
- brown to gray colored body with a white belly, furry tail, and ears smaller than that of a house mouse
- 6 inches long, including tail
- one of six species of white-footed mice found in Colorado

**Nesting Habits**
- prefer rural areas including fields, pastures and vegetative areas around buildings
- move indoors when it gets cold outside

**Diet**
- seeds, fruits, vegetation, berries, nuts and insects

**Significance**
- known carrier of Hantavirus Pulmonary Syndrome, a rare but potentially fatal lung disease

**IPM Recommendations**
- Repair or seal all openings that allow entrance.
- Remove indoor and outdoor debris that could harbor mice.
- Clear high weeds that serve as food and shelter during warm weather.
- Clean up food scraps and store foods in plastic containers with lids.

**Additional information available at:**
http://wildlife.state.co.us/WildlifeSpecies/Profiles/Mammals/Pages/WhiteFootedMice.aspx
http://ag.arizona.edu/urbanipm/buglist/mousemanagement.pdf
House Mouse
Mus musculus
Vertebrates

Adult house mouse
(Larry Master, Utah Conservation Data Center)

House mouse nest
(Rodger Jackman, osfimages.com)

House mouse damage to electrical wiring
(Robin Redfern, osfimages.com)
Identification

- brown to gray colored fur, with a lighter colored belly and large ears
- tail is naked and about the same length as the head and body combined
- 5 to 8 inches long, including tail

Nesting Habits

- create nests in protected areas out of paper, cardboard, fabric and other materials

Diet

- broad diet, usually cereal grains

Significance

- contaminate food, damage property and may transmit disease

IPM Recommendations

- Repair or seal all openings that allow entrance.
- Remove indoor and outdoor debris that could harbor mice.
- Clear high weeds that serve as food and shelter during warm weather.
- Clean up food scraps and store foods in plastic containers with lids.

Additional information available at:

http://www.idph.state.il.us/envhealth/pchousemouse.htm
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7483.html
http://ag.arizona.edu/urbanipm/buglist/mousemanagement.pdf
Pigeon droppings can be a health hazard if allowed to accumulate. (Kevin McGrath, University of Missouri).

Adult rock pigeon (Lee Karney, US Fish and Wildlife Service, Bugwood.org)

Adult rock pigeons (Terry Spivey, USDA Forest Service, Bugwood.org)

Pigeon droppings can be a health hazard if allowed to accumulate. (Kevin McGrath, University of Missouri).

Rock Pigeon
Columba livia

Vertebrates
Vertebrates

Rock Pigeon
*Columba livia*

**Identification**
- variable in color, but most are bluish-gray with two black bands on the wings and a black tip to the tail
- most have rainbow-like throat feathers
- 12 to 15 inches tall

**Nesting Habits**
- build nests out of twigs, grasses and sticks to form a crude platform
- nest on flat, covered surfaces such as sheltered cliff ledges, bridges and building surfaces

**Diet**
- primarily grain and seed eaters
- also garbage, livestock manure, insects or other food provided for them intentionally or unintentionally by people

**Significance**
- pigeon droppings may pose a health hazard when allowed to accumulate

**IPM Recommendations**
- Keep outdoor areas clean and eliminate water sources.
- Close building openings with wood, metal, glass or rust-proof iron mesh.
- Use deterrents such as spikes, coils and sloped surfaces.

Additional information available at:
http://coloradoipmcenter.agsci.colostate.edu/Communities/school_IPM.html
http://wildlife.state.co.us/
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