

# **Alaska Structural Pest Control Manual**



## **Category Seven**

In general, applicators who apply pesticides to property other than their own must obtain certification from the Alaska Department of Environmental Conservation (ADEC) Pesticide Program. Applicators who apply restricted-use pesticides, regardless of location, must also be certified.

**Individuals who apply pesticides in, on, or around structures and adjacent areas** to control pests in those structures must be certified by the Alaska Department of Environmental Conservation (ADEC) in Category Seven. Examples of applicators who should be certified in this category include those who work for a pest control company that sprays for carpenter ants which are nesting near a home, sets roach traps or other controls inside someone's home, or applies bed bug control in a hotel.

NOTE: This category does not include structural fumigation. This use is certified under Category 16. Use of anti-microbials within structures (carpet sanitizing, janitorial sanitizers) does not require certification

The information needed to successfully complete the written core examination required for all certified pesticide applicators in Alaska includes:

1. National Pesticide Applicator Certification Core Manual;
2. Alaska Core Manual; and
3. State of Alaska Pesticide Regulations in Title 18, Chapter 90 of the Alaska Administrative Code (18 AAC 90)

The information needed to successfully obtain certification in Category Seven, Structural Pest Control in Alaska includes:

1. This Alaska Manual; and
2. The Washington State University *Study Manual for Pest Management Professionals*.

### **Learning Objectives**

- List the most common structural pests in Alaska, and describe the identification, damage, biology, and behaviors of each.
- State how long bed bugs can survive without food.
- Explain why clutter must be removed to effectively control bed bugs.
- Explain why all gaps and exit routes must be sealed prior to heat or chemical treatment for bed bugs.
- Describe some effective chemical and non-chemical methods of controlling or reducing bed bugs.
- Explain why the use of 'bug bombs' is not recommended for control of bed bugs.
- Explain the most important element in controlling structural mold.
- Explain which kinds of birds are protected from capturing, killing, or interfering with nests.
- Describe each of the three different types pesticides that may be used against birds.
- Describe how to trap squirrels.
- Explain why rodenticides are not recommended for squirrels.

## **CALCULATIONS**

Precise and accurate application is important for every pesticide application, but this is particularly true for the types of pesticide applications allowed under Category Seven. Strong math skills, including the ability to calculate perimeters, odd shaped areas, volume, mixing ratios, rates of application, etc. will be necessary to successfully pass the Category Seven Exam. You will need to carefully review pages 164-165, and 190-192 in the National Core Manual. Additional resources for pesticide applicator math are available online from the [Purdue Pesticide Program](#).

## **COMMON STRUCTURAL PESTS IN ALASKA**

Although there are fewer structural pests in Alaska than in many other areas, there are still a number of pests that require control at times. Common invertebrate pests in Alaska include carpenter ants, carpet beetles, grain beetles, flour beetles, Indian meal moths, cockroaches, fleas, and spiders. Alaska is also subject to rodent problems, including voles, house mice, and rats.

Most of these pests are covered in the Washington State University Manual. Applicators should be familiar with the identification, biology, and behavior of these pests. Additional information on Alaskan pests is provided below.

### **Bed bugs**

Bed bugs are covered in the Washington State University Manual. However, due to their increasing presence across the nation, including Alaska, additional information is warranted.

Eradication of bed bugs can be extremely difficult – in general, chemical controls are only partially effective. Any bed bugs that remain can re-populate an area. In addition, bed bugs can easily survive up to 18 months without food. The use of Integrated Pest Management (several different tactics and methods used together) will result in the most effective control of bed bugs.

Bed bugs tend to hide behind baseboards, moldings, window frames, door frames, behind pictures, within paneled walls, in electrical outlets, inside electronic equipment, and any other small crevice or gap. This makes it difficult to reach bed bugs with control efforts.

Clutter is probably the single biggest obstacle that stands in the way of control. Bed bugs hide and lay their eggs virtually everywhere. As a result, clutter provides an unlimited number of hiding places for bed bugs. In addition, clutter creates areas that cannot be effectively treated or reached by control efforts. **The first step to controlling bed bugs is to eliminate as much clutter as possible and remove or expose as many hiding places as possible.**

Vacuum cleaners with disposable bags can be used to physically remove many bed bugs from areas of high infestation such as mattresses or other furniture. Low vapor steam cleaners that reach at least 220 degrees Fahrenheit can also be used to kill bed bugs in these areas. It is very important to dispose of the contents of the vacuum immediately after use. Vacuum bags should be placed into plastic trash bags, sealed shut, and disposed of outside of the building.

Furniture or other infested items that are to be disposed of should be tightly sealed in plastic, clearly labeled as “Infested with bed bugs”, and taken outside of the building. It is a good idea to

destroy or disassemble these items to prevent ‘dumpster divers’ from taking these items home and starting a new infestation elsewhere.

Heat treatment is one method of controlling bed bugs. Temperatures over 120 degrees Fahrenheit are lethal to bed bugs and their eggs. Special portable heat units can be used to rapidly raise the temperature in a room to lethal levels. **The entire contents of the room must remain above this temperature for several hours.** Special heater units and fans are required to achieve these temperatures consistently throughout a room. This method is only effective if all gaps and exit routes are blocked to prevent bed bugs from avoiding temperature extremes or migrating into different rooms, and if all clutter is removed to prevent safe harborage for bed bugs. One advantage of heat treatment is that it has no chemical or toxic effects. This treatment may damage sensitive items such as photographs or electronics.

Heat treatment requires specialized equipment. Homeowners cannot heat their homes thoroughly enough to kill bed bugs. However, they may heat their home well enough to burn it down. Only professionals with training and appropriate equipment can safely do heat treatments.

Cold treatment is often suggested for controlling bed bugs, particularly in dry cabins or other structures that can be frozen. However, studies have shown that bed bugs can hibernate and survive down to -20°F or colder. Cold will not kill bed bugs unless the bugs are frozen very quickly. Homeowners cannot cool all areas where bed bugs may reside quickly enough to control bed bugs.

Most of the pesticides that are commercially available for bed bugs are effective as a contact spray, but have little or no residual effect. Chemicals like DDT and Malathion which were used in the past were very effective, largely due to their long-term residual properties. However, these products are no longer available due to serious environmental and human health effects from these chemicals.

Many pesticides are not effective at killing bed bug eggs, so additional treatments are often necessary to kill the juveniles after eggs hatch. Many populations of bed bugs have developed resistance to common insecticides, making these chemicals ineffective. Regular, thorough inspections and a variety of treatment methods are often needed.

Available pesticides to control bed bugs change frequently. It is important for applicators to research products and know their advantages and disadvantages, as well as do regular reviews of information about available products.

**Foggers or ‘bug bombs’ do not effectively penetrate into the tiny cracks and crevices where bed bugs hide.** As a result, they introduce potentially dangerous chemicals into a building without being effective. Use of room foggers to control bed bugs is not recommended.

Whenever a bed bug infestation is identified, you should assume that rooms or apartments on all sides, including above and below, are also at risk. Whether heat or chemical controls are applied, these adjacent areas should also be treated.

## **Mold**

Various types of mold, including black mold, may grow inside of structures in Alaska. Molds have the potential to cause health problems from allergies to toxic reactions.

All molds require moisture to grow. The key to mold control is to physically remove visible mold, and then to control the amount of moisture or humidity in the building. Chemical biocides are generally not effective against molds unless the moisture problem is also addressed. A good control program utilizes chemical controls in conjunction with moisture reduction and control.

### **Vertebrates**

Vertebrates are any animals with a backbone or spinal column. This includes mammals (humans, moose, bats), reptiles (lizards, snakes), and birds. Insects, snails, and worms are examples of invertebrates. Vertebrate wildlife such as birds, bats, and moose are not considered pests in their normal habitats, but may become pests when they conflict with humans. A few vertebrates, such as rats and mice, are common pests in urban and industrial sites.

### **Bats**

Bats are covered in the Washington State University Manual. There are several species of bat in Alaska. The little brown bat is the most common. These bats are dark brown, and only 3-4 inches in length. There are some registered pesticide products containing naphthalene that claim to repel bats. Ultrasonic devices do not repel bats.

### **Birds**

Birds are covered in the Washington State University Manual. However, some additional information is warranted.

Birds in Alaska cause a variety of problems which may result in needing to control them.

- Gardens and landscaping may be damaged by birds such as magpies, crows, starlings, woodpeckers, pigeons, sparrows, robins, and geese who may feed, roost, or nest in these areas.
- Goose droppings may foul lawn areas in parks and yards.
- Attacks by nesting gulls are common in urban areas.
- Some urban areas have problems with large flocks of pigeons or other birds, which are a nuisance due to accumulation of droppings. Bird droppings near nesting and roosting sites may build up into a thick layer over time. They also contain ammonia and uric acids that can damage structures and can land on cars or people.
- Birds pose a significant risk to aircraft safety if they are present near landing strips or runways. In these areas, food sources such as grass or insects must be eliminated.
- Birds may carry some infectious diseases, including encephalitis, histoplasmosis, salmonella, and other viruses.

Before determining how to control a bird pest problem, it is important to understand that almost all birds are protected by Federal and state laws. Most birds in Alaska fall under the Migratory Bird Treaty Act, which makes it illegal to injure, capture, or kill these birds or to interfere with their nests. Pigeons, starlings and house sparrows are not directly protected because they are introduced species.

Bird netting can be used to reduce damage to gardens. Make sure the netting reaches the ground or birds may fly under the net and become trapped.

Canada geese prefer mowed lawn areas. Barrier fencing can be used to keep geese out of an area. Re-landscaping to eliminate large lawn areas may also be useful. Odor-based repellents (discussed below) are also an option.

Excluding birds from structures can reduce the number of birds nesting or roosting on buildings. Eliminate large crevices and block openings with netting or screen. Ledges and other roosting/nesting sites can be netted or have spike strips installed. Tacky gels are designed to be sticky enough to make a bird uncomfortable, but not so sticky that the birds are trapped. They can be applied to ledges and other roosting areas. These techniques can be used for any species of bird, provided you don't interfere with existing nests.

Frightening birds with scarecrows, reflective tape, loud noises, or other scare tactics rarely works over the long-term, as birds become used to the devices. Ultrasonic devices do not repel birds.

Removing nests and eggs may help reduce the number of birds in an area. However, it is illegal to interfere with the nests of any birds except sparrows, pigeons, and starlings.

Trapping, including net guns, may help to reduce the number of some birds. All traps must be removed if non-target birds are in the area, which makes this technique unpractical for most situations. You may be federally prosecuted if protected birds (all except pigeons, starlings, and sparrows) are impacted.

Avitrol is a pesticide product which is marketed as a "frightening repellent". Birds that eat the bait have seizures and send out distress signals, which scares off the rest of the flock. While only a small number of birds are killed, the risk of poisoning a protected bird is high. Frightening repellents should only be used in cases where bird control is critical. All bait must be removed if any non-target birds are present, which makes this technique unpractical for most situations. You may be federally prosecuted if protected birds (all except pigeons, starlings, and sparrows) are impacted.

Chemical sterilants are fertility control pesticides that prevent eggs from becoming fertilized. It may only be used to control non-protected birds. It will not kill birds but populations will slowly decline over the years. All bait must be removed if any non-target birds are present, which makes this technique unpractical for most situations. You may be federally prosecuted if protected birds (all except pigeons, starlings, and sparrows) are impacted.

There are several odor-based repellent pesticides designed for birds. These products contain methyl anthranilate. It is made from grapes and has a pleasant, fruity scent, and is used as a flavoring in some grape drinks. However, birds avoid the odor. This repellent doesn't harm the birds, so it may be used to discourage any type of bird. In some cases the product is dispensed into the air with a fogger for short term removal of birds. Other products are designed to be sprayed onto vegetation or structures, where it may remain effective for up to a week. These

products can be sticky or unpleasant for humans, so care must be taken when applying. This control may not be used in areas where it may interfere with nesting birds. This is the most common chemical control used for birds in Alaska, since repelling birds without harming them is not federally prohibited.

### **Tree Squirrels**

Bats are covered in the Washington State University Manual. There are two types of tree squirrels in Alaska; red squirrels and northern flying squirrels. Northern flying squirrels live in dense forest canopies and generally are not considered pests.

Red squirrels may move into structures, where they can be very destructive. They may chew on woodwork, tear out insulation or mattress stuffing for nesting material, cache food stores, or gnaw on wires. They may travel on power lines and short out transformers. They also create noise within walls and attics.

Red squirrels average about one foot in length (including their bushy tail), and are dark red color with a white underbelly. They are very energetic and are known for their noisy chatter. They remain active all year. Red squirrels mostly feed on spruce cones, but are also very attracted to food from bird feeders.

The best way to control squirrels in structures is to exclude them. The first step is to find out where the squirrels are entering. They can fit through almost any small opening, including holes that they gnaw through siding or shingles. Look also for knotholes, joints between siding, soffits, attic louvers, ventilators, chimneys, and openings where utility wires or pipes enter. Seal all openings or cover with heavy wire mesh.

Squirrels can be trapped with rat snap traps. Bait the traps with peanut butter, which will stick to the trap and keep the squirrel from snatching the bait and escaping. Traps should be located on the roof, the base of trees, or in the attic. Make sure to tie or nail down the trap. Red squirrels are considered furbearers in Alaska, but there is no closed season, and no bag limit for hunting and trapping of red squirrels.

There are many pesticide products that list squirrels as a target species, and can be effective against red squirrels. However, squirrels are very mobile, and are a main food source for many predators including hawks, owls, and, martens. Due to the likelihood of secondary poisoning, use of rodenticides for squirrels is not encouraged. There are also several pesticide products that claim to repel squirrels.

There are some registered pesticide products containing naphthalene that claim to repel squirrels. Ultrasonic devices do not repel squirrels.

**WASHINGTON STATE UNIVERSITY STUDY MANUAL FOR PEST MANAGEMENT PROFESSIONALS**

**Portions to Disregard**

You may disregard the following sections or pages of the Washington State University manual:

- **Chapter 3, Termites;** pages 18-23. These pests do not occur in Alaska.
- **Chapter 9, Medically Important Insects;** pages 69-77, including information on bees, scorpions brown recluse spiders, black widow spiders, mosquitoes and biting flies. Bees do not overwinter naturally in Alaska, and generally do not present a problem that requires control. Scorpions, brown recluse spiders, and black widow spiders, are not found in Alaska. Mosquitoes and biting flies are regulated under Alaska certification Category Ten.
- **Chapter 11, Vertebrate Pests;** pages 89, pages 100-108, and pages 124-125, including information on gophers, moles, skunks, and snakes. These pests do not occur in Alaska.
- **Chapter 12, Inspections for Wood Destroying Organisms;** pages 111-115, including information on how to conduct a structural inspection. Alaska does not require pesticide applicator certification for this activity.

**Learning Objectives**

**Basic Entomology**

- Describe the physical characteristics of insects.
- Define the terms molting, metamorphosis, instar, nymph, and larva.
- List the stages of simple metamorphosis.
- Give some examples of insects that undergo simple metamorphosis.
- List the stages of complex metamorphosis.
- Give some examples of insects that undergo complex metamorphosis.
- Describe characteristics of the following types of insects or insect-like pests: silverfish, grasshoppers/cockroaches, earwigs, book lice, true bugs, aphids/leafhoppers/scales, beetles, weevils, moths, flies/gnats, fleas, bees/wasps/ants/sawflies, mites/spiders.

**Pest Management**

- Describe the six steps of IPM.
- Describe the three forms of injury or damage levels evaluated in IPM which are used to determine an action threshold.
- List some non-chemical methods of controlling pests.
- Name some common pyrethroids used for structural control.
- Explain why there are few chlorinated hydrocarbons currently registered for use.
- Explain how organophosphates work to kill insects.
- Describe a significant drawback to carbamate type insecticides.
- List some currently used active ingredients in each of the following type of insecticide: botanicals, chlorinated hydrocarbons, organophosphates, carbamates, fumigants, and pesticidal bacteria.
- Explain how rodents ingest tracking powders.
- Describe the following application methods and the equipment used: crack and crevice, perimeter sprays, space fumigation, space treatment, spot treatment.



- List the pressure range that is generally needed for the following types of applications when using a 1 gallon compressed air sprayer: spot or general application (fan spray), crack and crevice (pin stream),
- Describe the differences between the following types of dusters: hand duster, pump duster, pressure duster.
- State the droplet size that is most effective for space fumigation.
- Explain why electrical switches and pilot lights must be turned off before using a thermal-fog generator.
- Describe the advantages and disadvantages of ULV treatments.
- Describe the steps for calibrating a sprayer.
- Calculate perimeters, areas, room volumes, sprayer output, required quantities, unit conversions, and other example problems.

### **Ants**

- Describe the identification, damage, biology, and behaviors of ants.
- List the number of ants typically found in a colony.
- List the developmental stages that ants pass through, and describe the appearance of each.
- Use the key to identify ant species.
- Describe the typical location of carpenter ant colonies.
- Describe the appearance of carpenter ant trails between main and satellite colonies.
- Describe distinguishing characteristics of carpenter ant physiology.
- List common foods of carpenter ants.
- Explain how to distinguish frass (sawdust) due to carpenter ants from other types of sawdust or frass.
- Describe other indicators of carpenter ant colonies in structures.
- Explain how moisture in structures can contribute to establishment of carpenter ant colonies.

### **Other Wood Pests**

- Describe characteristic evidence of the presence of wood boring beetles.
- List steps to take to reduce the likelihood of an infestation of anobiid beetles.
- Describe the identification, damage, biology, and behaviors of lyctid beetles.
- Describe the identification, damage, biology, and behaviors of buprestid beetles.
- Describe the identification, damage, biology, and behaviors of cerambycid beetles.
- Explain why chemical control on structures is generally not necessary after evidence of wood boring beetle or horntail wasp activity is found.
- Describe the characteristics of brown rot fungus, white rot fungus, and soft rot fungus.
- List the primary method to control fungus.

### **Cockroaches**

- Describe the identification, biology, development, behaviors, and damage of cockroaches.
- Describe the distinguishing characteristics and typical locations of the following species of cockroach; brown banded, American, oriental, and German.
- Describe ways to reduce harborage for cockroaches.

- Describe ways to improve sanitation to help reduce cockroaches.
- Explain why it is important to know the typical hiding locations of the species of roach to be treated prior to applying chemical controls.
- Describe where to apply, and precautions to take when applying residual sprays.
- List the percentage active ingredient that should be used in space sprays for flushing roaches from harborage and for direct treatment (killing roaches).
- Describe areas where treatment with dust is beneficial.

### **Food and Fabric Pests**

- Describe the identification, biology, development, behaviors, and damage of the various food pests.
- Describe ways to improve sanitation to help reduce food pests.
- List the temperatures and holding times needed to eliminate food pests for both heat and cold treatments.
- Describe the identification, biology, development, behaviors, and damage of the various fabric pests.
- Describe ways to improve sanitation to help reduce fabric pests.

### **Nuisance Pests**

- Describe the identification, biology, development, behaviors, and damage of the various nuisance pests.
- List non-chemical methods of controlling or excluding nuisance pests.

### **Medically Important Insects**

- Describe the identification, biology, development, behaviors, and damage caused by yellowjackets and wasps.
- Describe chemical and non-chemical methods for controlling yellowjackets and wasps in various locations.
- Describe the identification, biology, development, behaviors, and symptoms caused by hobo spiders.
- Describe the identification, biology, development, behaviors, and symptoms caused by bed bugs.
- Describe the identification, biology, development, behaviors, and symptoms caused by fleas.
- Describe chemical and non-chemical methods for controlling fleas.

### **Vertebrate Pests**

- List the five things that must be identified to determine if control is necessary for vertebrate pests.
- Describe the identification, biology, development, behaviors, and damage caused by mice.
- Describe the identification, biology, development, behaviors, and damage caused by rats.
- Describe the various diseases that can be spread by rodents.
- List methods to exclude rodents from entry into a structure.

- Describe ways to improve sanitation to help reduce rodents.
- Describe techniques to improve effectiveness of trapping for rodents.
- Compare advantages of acute versus chronic rodenticides.
- Explain some reasons why rodenticide use may fail to control a rodent population.
- Explain how rodents ingest tracking powders.
- Describe some precautions that should be taken when using tracking powders.
- Describe damage that may be caused by tree squirrels (red squirrels and northern flying squirrels occur in Alaska).
- Describe various methods for controlling tree squirrels.
- Describe the identification, biology, development, behaviors, damage, and health hazards caused by bats.
- Describe non-chemical methods to control bats.
- Describe how to get bats out of a structure.
- List some things that may repel bats.
- Explain why bat eradication should not be attempted in summer months.
- Describe non-chemical methods to control bird pests.
- Describe techniques to improve effectiveness of controlling birds with pesticides.

**Before Using Any Pesticide**

**STOP**

**All pesticides can be harmful to health  
and environment if misused.**

**Read the label  
carefully. Use only  
as directed.**