



**Nontoxic pest management
for collections and their facilities:**
a training manual

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2001

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Introduction

There are many threats to archival, library, and museum collections, but the most significant one is time. Paper, leather, and vellum are derived from organic sources, so they naturally decay. Most papers manufactured after the middle of the nineteenth century are highly acidic and decay rapidly.

Unfortunately, deterioration can be hastened by unsuitable environmental conditions. Other threats include pests, (usually molds, mildews, insects, or small rodents); rough handling; natural disasters, such as floods or fires; theft; and vandalism.

Some losses can be prevented.

Many of the conditions that encourage infestations also accelerate the decay of paper-based products—but this one-two punch can be avoided through careful maintenance of your facility.

This manual introduces nontoxic integrated pest management (IPM) techniques for the major pests of collections, focusing on paper-based materials.

IPM offers cost-effective strategies for managing pests that minimize the risks to your collections, staff, and visitors. IPM will help you understand why pest problems happen and what you can do to prevent them. Prevention is the heart of the IPM approach to collections, because some objects are irreplaceable.

Conventional pest management practices that rely solely on the application of pesticides are unlikely to prevent infestations. In addition to the risks they pose to people, some pesticides also stain or weaken paper-based materials, so it's possible that objects that weren't hurt by the pests could be threatened by the cure.

Pests thrive when they have easy access to food, water, and shelter. Eliminate those sources and they'll likely seek a more hospitable home. Begin by evaluating conditions both within and outside your facility; the best defense for your collection is to keep pests from ever entering the building.

Thoroughly inspect items before they're brought into your collection. Use a magnifying glass to look for live insects, cocoons, droppings, or signs of damage. If you suspect an infestation, isolate the materials until they can be evaluated.

Listen to Goldilocks:

Be picky about the environmental conditions of your facility

To extend the lifespan of your collection, maintain temperature and relative humidity at moderate and stable levels *all the time*, including evenings, weekends, and holidays.

How stable? The National Information Standards Organization (NISO) technical report, "Environmental guidelines for the storage of paper records," suggests that ideally, temperature would be maintained within 2°F and relative humidity within 3% of the chosen standards.

If you can't keep conditions "just right"—not too hot, not too cold—avoid extremes and precipitous changes. Rapid fluctuations do the most harm to collections. Relax the standards a bit for summer and winter if necessary, but ease into these seasons with gradual changes in temperature and humidity. Realistically, a 5°F variation in temperature and 5% fluctuation in relative humidity are acceptable, according to NISO.

TEMPERATURE:

Most of the deterioration of archival materials is caused by chemical reactions, which are accelerated by heat. When the temperature rises from 68°F to 70°F, the decay rate of cellulose, the main ingredient in paper, more than doubles.

Although experts differ on the ideal temperature for archival materials, most agree it should be no higher than 70–72°F. And lower temperatures are better. If people enter an area only to retrieve resources, 60–65°F is preferable.

Consider cold storage at 35–50°F for materials that are used infrequently. This isn't practical for items that are used often because quick temperature changes can cause condensation problems. Items removed from cold storage should be allowed to reach room temperature slowly.

What do pests like?

Warmth. Many insects find temperatures of 68–86°F perfect; molds and rodents also prefer warm conditions. Exposure to temperatures below 28°F or above 113°F will kill most insects.

Although they're an effective pest control, heat treatments aren't recommended because they can damage paper.

Controlled freezing, however, is a promising non-toxic alternative that some organizations have been experimenting with for over 15 years. So far, treatments at -20°F for 72 hours seem most successful. The freezer should reach 32°F within four hours and -4°F within eight hours or the insects may acclimate to the cold.

RELATIVE HUMIDITY (RH):

This is a measure of the amount of moisture in the air at a specific temperature and pressure, expressed as a percentage of the total amount air can hold under those circumstances. Warm air usually holds more moisture. Because relative humidity depends on temperature, the two factors should be considered together.

Many collection materials are made from different components. Books, for example, often consist of paper, board, string, adhesive, cloth, and leather. As the humidity in the air changes, so does the moisture content of each component, and that's a problem. These materials stretch or shrink at different rates, which can cause books to fall apart.

The collection manager must balance several factors to establish a standard for relative humidity. The RH must be high enough to allow the materials to remain flexible, but low enough to slow decay, discourage infestations by insects and molds, and prevent condensation within the building during cold weather. (Condensation can weaken the building's frame.)

A relative humidity of 30–50% is recommended but it's better to aim for the lower end of this range. Most important to control are daily and weekly fluctuations, which should be kept within 3 to 5 percent.

What do pests like?

Humidity of 60-80% provides ideal conditions for many insects. Add warmth, and many pests will find the conditions “just right.” This means they'll feed, defecate, and reproduce more often, causing greater damage to your collection.

In addition to the moisture in the air, pests will find all the water they need from such sources as sprinkler systems, water pipes, plants, bathrooms, kitchens, drains, water fountains, custodial closets, air conditioners, dehumidifiers, gutters, basements, and roofs.

Want to know what your conditions mean for the longevity of your collection? The Rochester Institute of Technology offers the “Preservation Calculator,” free software that estimates the lifespan of your collection based on your temperature and humidity figures. It also suggests when molds will begin growing. The calculator is available at www.rit.edu/~661www1/sub_pages/frameset3.html.

LIGHT:

Even brief exposure to light, especially ultraviolet radiation, embrittles paper fibers. Paper and dyes may fade, change color, or darken, reducing the legibility of the document.

For the best protection, items may be stored in special containers or windowless rooms. Incandescent bulbs are the least damaging light source; fluorescent lamps can be outfitted with ultraviolet filters to make them safer.

Turn on lights only when needed and then for the shortest time possible. Cover windows and skylights to block the sun.

What do pests like?

Many insects like small, dark, quiet places—and storage spaces abound with them. Corrugated boxes, corners, and undisturbed piles all provide welcoming homes for many pests, as do the spaces underneath and behind bookcases, and cracks in the walls, floor, or furniture.

Leaving lights on won't adequately discourage insects and could harm the collection. Some of the wavelengths beyond visible light, including gamma radiation and microwaves, are deadly to insects; they're used to control pests in certain agricultural settings. But neither will do your collection any good because both processes may seriously damage paper-based materials.

AIR QUALITY:

Pollutants, such as sulfur dioxide, nitrogen oxides, and ozone catalyze chemical reactions that can lead to the formation of acids in materials. Paper can discolor and become brittle, while leather may turn powdery.

Dirt, dust, soot, and mold spores can abrade and soil objects, but there's an easy solution: clean often and thoroughly.

Good air exchange will help control air quality. Pockets of dead air should be eliminated because they confound attempts to regulate humidity and temperature and encourage the growth of molds. Even small fans, if well-placed, may take care of the problem.

Think of air pollution as a "pest"—and try to keep it from getting into the building. Locate air intake vents as far away from significant pollution sources, such as loading docks, as possible. Keep exterior windows closed.

Interior sources of air pollutants may be more challenging. Although it may be possible to prohibit smoking and photocopy machines in your collection area, it may be more difficult to deal with gases released by carpets, furniture, paints, and cleaning compounds.

Filters can remove both gaseous and particulate contaminants. Particulate filters that are at least 60% efficient are useful for large areas, while the very efficient but costly HEPA filters may be practical in small, closed areas. Electrostatic filters are not recommended because they produce ozone.

What do pests like?

Pests, by definition, survive conditions that are tolerable for people. If they couldn't, they wouldn't live near us.

But "pollution" may become an effective pest management technique. Over the past decade, some organizations have tried modifying the atmosphere—"polluting it" with carbon dioxide or nitrogen gas, or removing oxygen—to kill insects. This treatment, called "modified atmospheres," is done in a traditional fumigation chamber, a portable fumigation bubble, or special plastic bags.

The bottom line

- Many of the conditions that prevent infestations also slow the decay of paper.
- IPM (integrated pest management) is a cost-effective approach that will help prevent infestations. And prevention is the best pest management technique of all.
- Pesticides may harm papers; they pose risks to people and the environment. The use of pesticides won't prevent future problems or reverse damage.
- Pests need food, water, and shelter. Control those sources and the pests will seek an easier living elsewhere. Monitor conditions within and outside your facility.
- Maintain stable, moderate environmental conditions all the time. Rapid fluctuations damage collections. (Watch temperature, relative humidity, light levels, and air quality.)
- Papers like it cool and dry—and pests don't.
- Papers and pests prefer dark conditions.
- Say "no!" to treatments involving heat, gamma radiation, microwaves, or electrostatic filters. They're useful elsewhere but can damage paper.
- Air pollution is more damaging to papers than to pests—unless it's the result of some innovative pest management techniques called "modified atmospheres."

For more information about IPM and other preservation concerns, please read on, then consult the resources section.

New York State regulations

The New York State Department of Environmental Conservation (DEC) is responsible for the administration and enforcement of New York State's laws and regulations pertaining to the use of pesticides. The DEC certifies pesticide applicators, registers pesticide businesses, issues permits for the sale of restricted use pesticides, and registers pesticide products. For more information, contact the DEC Region 8 Pesticide Program office in Bath at (607) 776-2165 or in Avon at (716) 226-2466.

Of particular relevance to the implementation of nontoxic pest management is the appropriate use of U.S. Environmental Protection Agency (EPA) registered products. If a product has an EPA registration and/or establishment number, it can only be applied in a commercial (work-related) context—only by, or under the supervision of, a certified pesticide applicator. The EPA registration and establishment numbers will be listed on the product's label.

This means that uncertified employees can't buy an EPA registered product at the local hardware store and legally use it at their own discretion at work. Some low-toxic products such as repellents and mint oil formulations are registered with the EPA.

The DEC also regulates the removal of wild animals that may become pests. Many species of wild animals cannot legally be removed without the appropriate permit. Contact the DEC Region 8 Bureau of Wildlife in Avon for details.

Integrated pest management (IPM)

IPM provides a framework for effectively implementing nontoxic pest management. IPM can be defined as a systematic and proactive approach to pest management that provides better pest control while reducing the need for pesticide use.

As of January 2000, New York State has an official definition of IPM in the DEC regulations (6 NYCRR Part 325 Rules and Regulations Relating to the Application of Pesticides, Revised January 21, 2000):

“Integrated Pest Management (IPM) means a systematic approach to managing pests which focuses on long-term prevention or suppression with minimal impact on human health, the environment and non-target organisms.

IPM incorporates all reasonable measures to prevent pest problems by properly identifying pests, monitoring population dynamics, and utilizing cultural, physical, biological or chemical pest population control methods to reduce pests to acceptable levels.”

The fundamentals of IPM

What is IPM?

IPM involves the use of multiple approaches to solve pest problems. No one method (be it spraying pesticides or any other technique) is depended upon as *the* tool. The more potential “tools in the tool box,” the better. In addition, these multiple techniques are applied in a systematic and planned fashion. Usually a combination of control methods works best.

The focus of IPM is on long-term pest control and especially on the prevention of pest infestations. IPM is proactive. The pest manager does not simply react to pest problems after they occur but seeks to anticipate and prevent such problems.

People who use IPM are concerned about risks to human health and safety and damage to the environment (soil, air, and water contamination, and danger to other organisms. Of special concern are risks to those beneficial organisms that help control pest populations, such as predators and parasites that kill pests). The potential harm could be caused by the pests or by the methods used to control the pests.

The main concepts

Here are the main tenets of IPM (noted in italics). Each will be discussed in detail later.

In order to have an effective, consistent IPM program, an organization needs a written *pest management policy*. This policy should clearly state who makes decisions and how the pest management practices will be implemented.

Site plans allow the pest manager to evaluate pest problems and control efforts. Such plans also are important in communicating the status of the pest management program to everyone who’s involved in the effort.

Inspections and *monitoring* are key components of an IPM program. In fact, when at a site, pest managers usually spend most of their time

inspecting the premises. *Diagnosis*, the accurate identification of the pests encountered, is an important part of this process.

Sanitation is a crucial component of effective pest management. Often efforts to control pests fail (or must be repeated frequently) because of inadequate sanitation. General upkeep, or *maintenance*, of a building is also vital, especially to the prevention of pest problems.

One of the best ways to control problems of turf, trees, and other landscape plantings is through proper *plant care*. Healthy plants are much more resistant to pests and diseases than stressed plants.

As stated previously, IPM uses several *control options*—not just one—to manage existing pests. Different types of control include sanitation, exclusion, mechanical removal, cultural methods, biological control, and chemical control. Pest populations are often evaluated according to the *threshold concept*: pests are not actively controlled until a certain level of pest activity is reached; the benefits of the treatment must outweigh its costs.

Especially in public buildings, *notification* and *public awareness* campaigns are important. Building occupants should be kept informed of the steps being taken to manage pests.

Accurate and thorough *record keeping* is the backbone of a successful IPM program. Records are used to coordinate pest management efforts, to communicate with people affected by these activities, and to evaluate the effectiveness of the pest management effort.

In conclusion, an IPM program provides systematic feedback to the pest manager. Inspections lead to appropriate actions. The results of these actions are then evaluated in subsequent inspections, which may lead to modified action.

Site plans

Site plans are used to direct the inspection and record its results. Sites plans are maps of the property that show important features; building site plans are

usually floor plans (figure 1), while exterior site plans (figure 2) show the location of trees, notable plantings, and landscape features. You'll mark the locations of important aspects of the pest management program on the site plan. Note the location of monitoring stations, pest problems (current, persistent, or potential), recommended work (such as exclusion), and the control efforts (as traps or bait stations).

Inspections and monitoring

Inspections are regular surveys of the pest status of the property. Monitoring is part of the inspection process and focuses on evaluating the size of pest populations. Counting the number of insect pests on sticky boards, or the number of grubs per square foot of turf, or the frequency of mouse droppings are all examples of monitoring.

The condition of the property is also evaluated during the inspection. The general health of landscaping plants and turf is checked. The pest manager looks for present and potential problems in buildings, such as deteriorating woodwork, animal entry holes, vents with damaged screening, and sanitation problems.

BASIC EQUIPMENT

A good flashlight is the most important tool for inspecting buildings. Other tools include small mirrors, spatulas, and screwdrivers for investigating the flat and narrow crevices that shelter pests.

Safety equipment (respirators, bump hats, protective clothing) should also be used when inspecting certain areas of a structure. This is discussed later under "Practitioner safety issues."

Basic tools for the inspection of landscaping and turf include a hand lens, pocket references, such as identification aids, and a small digging tool, such as a hand trowel.

INSPECTION PROCEDURES

The inspector should systematically look for signs of current pest activity and for situations that might promote future pest problems. Using the site plan as a guide, decide on a travel route that will cover the property.

The inspection can be thorough or take a "triage" approach. A thorough inspection will cover all portions of the property that might be affected by the target pests while a triage approach would focus on the most vulnerable areas. Often, an initial inspection will be thorough, followed by "triage" inspections.

It is important to accurately document the results of the inspections. This can be done on specific inspection forms; often, the inspector uses a copy of the site plan.

Here are examples of inspections:

Thorough inspection of a building for rodents (excerpted from *Beasts Begone*, a booklet published by the NYS IPM Program):

During the inspection, look for fecal droppings, runways (which are easily seen in insulation), tracks, rub marks, urine stains, gnaw marks, food caches, nests, evidence of past control efforts (such as empty pesticide containers or old repairs), burrows, access routes, carcasses, and live animals. Listen for the sounds pests make when they vocalize, feed, and move around. Do you notice any pungent, mildewy, musky, or penetrating odors?

In the building's interior, work systematically from the lower floors up to the top floor. Within each room, move either clockwise or counterclockwise. Pay particular attention to the corners and underneath and behind furniture.

If there are suspended ceilings, push up the panels in several locations to check above the ceiling. Inspect attics, basements, closets, built-in drawers, areas underneath sinks, plumbing/utility accesses, and crawl spaces.

Outside, thoroughly inspect the foundation and upper portions of the structure. Be sure to check areas beneath decks, crawl spaces, dumpsters, garbage storage areas, piles of firewood, lumber, or debris. Inspect garages, eaves, dormers, windows, vents, ledges, chimneys, and roof corners.

Inspection of perennial beds for insect pests and diseases (from Jana Lamboy, NYS IPM Program):

Move slowly around the periphery of the beds. Using a hand lens when necessary, thoroughly inspect several individual plants of each species present in each bed. Check beneath the leaves, on the stems, and within the flower heads.

Carry a small plastic bag and, when practical, remove pest insects and disease cankers from the plants and put them in the bag. Clip off the seed heads of weeds, or dig up the whole plant, and place them in the bag.

The insect pests collected can be put into a container of soapy water to kill them. Unknown insects and diseases can be identified with the help of keys or preserved and sent to Cornell Cooperative Extension for identification.

Be aware of the pest and disease history of each bed and the pests and diseases that are common for that time of year. Remember to record insect pests, natural enemies, and signs of disease encountered. (“Natural enemies” are organisms such as predators, parasites, and microbes that attack pests.)

Inspection of a lawn for grubs (excerpted from *All about white grubs*, a brochure published by the NYS IPM Program):

Because grubs are feeding in the root zone, you must dig up the sod in order to see them. Cut a square foot of sod on three sides with a shovel, then fold it back to expose the soil and grubs. After the grubs are counted, replace the sod and water it thoroughly.

A golf course cup cutter can also be used to remove $\frac{1}{10}$ of a square foot of sod, making it easy to estimate the number of grubs per square foot.

Sampling sites may be spaced 10–20 ft. apart, depending on the size of the property. Special attention can be paid to “showcase” areas and to areas with a history of grub damage.

Note your sampling sites on a simple map. Record the number of grubs found at each site and which kinds were present. This information will be used to decide whether the population is high enough to

justify treatment. If a treatment is applied, its effectiveness can be determined by doing follow-up sampling.

DIAGNOSTICS

Correct pest identification is often vital to effective control. An inaccurate identification may lead to control efforts that fail—or may even aggravate the situation. Cornell Cooperative Extension is an excellent resource in assisting with pest diagnosis.

RECOMMENDATIONS

Written recommendations should to be made after completing an inspection. These could include steps to help prevent future pest problems including improved sanitation, maintenance, and plant care. If current pests need to be controlled, the control options should be described.

Sanitation

In order to survive, pests need three things: food, water, and a place to live (often called “shelter” or “harborage areas”). Sanitation is important to pest control because it reduces these three resources. To be most effective, consider the “pest’s point-of-view” when cleaning areas. This is what pest control consultant Robert Corrigan refers to as “microsanitation.”

For example, regular mopping of a kitchen floor may not be enough to remove food sources for pests such as cockroaches—even small crumbs can provide enough food and shelter for them. Small particles of food and grease can accumulate in the cracks and crevices behind mop boards and equipment. An area that’s clean enough to satisfy many people may not be clean enough to discourage pests.

Trash management is very important in pest control. Dumpster lids should fit tightly and be kept closed; try to reduce spills. Inside, trash containers should be emptied frequently. In sensitive areas, such as kitchens, trash shouldn’t be kept overnight.

Eliminate debris to reduce pest harborage. For example, wood piles shouldn’t be placed against foundations because they provide cover for pests near the building.

Don't use cardboard for long-term storage in kitchens and other food areas. Its corrugations provide ideal shelter for small pests, including cockroaches.

Metal storage racks that are on wheels reduce harborage, and make it easier to inspect behind and beneath the racks.

Pests frequently “hitch a ride” on items brought into the property. A procedure for inspecting such items (and isolating and treating them, if necessary) can be very helpful. This is especially important in key sensitive areas such as kitchens.

Maintenance

Building maintenance and repair is important in denying pests access into a structure. Good maintenance takes care of known pest entry sites and prevents others from occurring.

Again, it's important to “think like the pest.” Know the major access routes that allow pests onto (and into) a structure. For example, tree limbs overhanging a roof allow carpenter ants, rodents, and raccoons to get into the building. Also, certain pests are more likely to enter around the foundation than along the roofline. Know the size of the openings needed by particular pests. Mice can enter through holes that are a half-inch wide, but rats need larger openings.

Plant care

Proper care helps plants maintain the vigor needed to resist damage by pests and diseases. Here are suggestions from Ken Carnes, Cornell Cooperative Extension of Albany County, about caring for indoor and outdoor plants.

Tropical houseplants at work:

- Start with healthy “pest-free” plants.
- Each week, inspect plants when you're watering them. Check under the leaves and on the growing tips for insects, and inspect any leaf spots you see for diseases.
- Remove and destroy any insects you find by smashing them or using a cotton ball with rubbing alcohol.

- Don't spray pesticides at work, even if your plants are infested. Take the plants home or throw them away.

Landscape trees, shrubs, and flower beds:

- Select healthy plants, preferably varieties that are resistant to pests, including insects and diseases. Choose plants that are appropriate for your location.
- To select an appropriate variety for your locale, consider soil type, pH, grade, and your area's hardiness zone.
- Consult with Cornell Cooperative Extension to understand your options.
- Install and maintain a 2–4 in. mulch surface/ring around all plants to prevent weed growth, keep the roots cool and moist, and protect the plants from lawn mowers and trimmers.
- Scout and monitor closely, especially during the first two years, to make sure adequate moisture is available and pest problems are under control.
- If a pest problem surfaces, don't spray pesticides! This is a job for a certified arborist or DEC licensed applicator.
- Avoid piling mulch around trunks and stems—this encourages voles and slugs to damage plant material. Enlarge the mulch ring as the canopy grows to maintain a donut-like shape.
- Call Cornell Cooperative Extension for advice.

Control of current pests

Thresholds

Pests are not actively controlled until their activity reaches a certain threshold. This concept, a type of “cost/benefit” analysis, was developed in agricultural IPM. Researchers determined the point at which the cost of treating the pests was lower than the cost of the crop damage they were likely to cause if left untreated. This idea was expanded to address the many other settings that require pest management.

A *health and safety threshold* describes the level of pest activity that endangers human health and safety. An *economic threshold* refers to a net financial loss caused by pests, usually due to property damage. Finally, a *social tolerance (or aesthetic) threshold*

refers to the level of pest activity that most people refuse to tolerate.

Many factors affect the actual thresholds that might be used to guide your pest management decisions. The species of pest, the type of threshold (health and safety, economic, or social tolerance), and the general condition of the property are some factors.

For example, here are suggested thresholds:

- 8–10 Japanese beetle grubs per sq. ft. of a typical lawn (from *All about white grubs*);
- Carpenter ants: in most rooms, three ants per room. In a kitchen, two ants. Take immediate action if you believe the colony is located inside or within 25 ft. of the building (from *Action thresholds in school IPM programs*, Maryland Dep't. of Agriculture);
- 10 or more yellow jackets at a trash can per ten-minute counting period (from *Action thresholds in school IPM programs*, Maryland Dep't. of Agriculture).

Control options

The purpose of this section is not to describe every type of control technique for every type of pest but to introduce the major categories of control methods available. Pest management programs are customized for each situation and usually feature a combination of techniques.

Harborage reduction and other *sanitation* practices help prevent pest infestations and are usually necessary to control current problems.

Physically blocking pest entry sites (*exclusion*) is an important control strategy. It is particularly effective if the pests are not able to create new openings.

Physical or mechanical removal refers to the trapping or direct removal of pests. Examples would include picking pest insects off potted plants, catching insects in sticky traps or mice in snap traps.

There are two definitions of “*cultural methods*.” For landscape and turf, cultural methods are practices used to keep plants healthy so they can better resist

pests. In structural pest management, “cultural methods” usually refers to efforts to persuade people to change their behavior so they’re not creating ideal conditions for pests. For example, a pest manager would try to convince people to stop feeding pigeons in areas where the birds cause problems.

Biological control is the use of the pest’s natural enemies (predators, parasites, diseases) to keep pest populations at a tolerable level. Most biological control methods are used in agricultural and landscape pest management. Very few practical biological control strategies are available for pest management within buildings.

Chemical control usually refers to the use of products developed and sold for the control of pests (pesticides). In nontoxic pest management, the chemicals chosen should have the lowest possible toxicity category; they should either be non-carcinogenic or have the lowest carcinogenic rating possible (as determined by the US EPA). Preference should be given to those pesticides containing active ingredients that are EPA exempt materials.

Notification and public awareness

Let people know about the steps you’re taking to control pests through notification and public awareness campaigns. Signs and mailings are commonly used to inform people about pest management activities.

Some types of notification are legally required. Under New York State law, commercial lawn care applicators must have a written agreement with property owners or their agent that includes the number of applications and the approximate dates of the treatments. At the time of application, signs must be posted on the property; these signs must conform to specific criteria (*Title 10, Article 33 of the Environmental Conservation Law*, NYS DEC).

Last August, Governor Pataki signed legislation that increased notification requirements. This legislation took effect on March 1, 2001. The requirements are mandatory for schools and day care centers. Counties are also authorized to adopt the legislation county-wide.

Details of the legislation (New York State Bill S08223) are available at the following web site: < <http://assembly.state.ny.us/cgi-bin/showtext?billnum=S08223>>.

Besides what's legally required, it is often wise to notify the public about pest management efforts whether or not pesticides are being used. This is an opportunity to educate the public and promote better pest management practices.

Record keeping

What kinds of records should you keep and share with others? Site plans; inspection and monitoring results; recommendations; responses to recommendations, including details of control efforts; and pest sightings. A pest sighting log (Fig. 3) is used by the building occupants to report any sightings or signs of pests.

Keep one set of permanent records, but make sure that copies are available in accessible locations for use by anyone who's interested. This is especially important for the pest sighting log.

Information entered in the records should be *accurate, thorough, and legible*. Remember that the main reason to keep records is to communicate effectively, to ensure that everyone understands your pest management program.

IPM is most successful when everyone who uses the property support the effort. To do this, they need to understand the problem and the IPM solution. For example, if people know that the kitchen needs to be kept especially clean, they'll probably be more careful about cleaning up even the smallest crumbs.

Practitioner safety issues

Risks associated with pests and pest management

There are risks associated with pest management beyond those related to the use of pesticides. This section briefly discusses such risks; more detailed information can be obtained from Cornell Cooperative Extension, the US Occupational Health and Safety Authority (OSHA), and books such as the *Pest Control Technician Safety Manual* (see Resources section).

FALLING FROM A LADDER

Unfortunately, accidents associated with ladders are fairly frequent and often serious. They often result when the operator is hurried or distracted, and not concentrating on the safe use of the ladder.

To use ladders safely, first make sure that the ladder is the appropriate design and strength for the job. It should be placed at a safe angle and secured properly, both at the top and bottom. Inspect ladders frequently and do not use damaged ladders until they are effectively repaired.

Avoid the temptation to lean off the side of the ladder because that may cause you to lose your balance. Learn and practice the techniques for safely ascending, descending, and stepping off a ladder.

ZOONOTIC DISEASE

Zoonotic diseases are illnesses that humans can catch from animals. Limiting contact with wild animals is one of the best defenses against such diseases. But some zoonotic diseases can even be contracted from contact with the animal's habitat.

To protect yourself, use appropriate equipment and protective clothing, such as animal handling gloves. In a confined space (such as an attic) that's infested by an animal, wear a respirator. Make sure it fits properly and has a high efficiency particulate air (HEPA) filter.

BITES AND STINGS

When practical, avoid situations in which you might get bitten by an animal or stung by an insect. This is particularly important if you're allergic to wasp and bee stings. If you are bitten or stung, report the event—especially if the injury was caused by a mammal, because of the risk of rabies.

Wear light colored, but not colorful clothing whenever you're doing something to control stinging insects. As you approach the nest, be careful not to vibrate it or shine a light directly on it. It's wise to wear protective clothing ("bee suits") when dealing with a large nest.

Protective equipment

There are several types of equipment that help protect you from physical injury. *Safety helmets* range from "bump caps" to helmets with visors. Some helmet designs attach snugly to the head to give added protection in case of a fall.

Protective clothing can range from long-sleeved cotton shirts to disposable coveralls. *Knee pads* protect this sensitive part of the body while you're crawling around in attics and crawlspaces.

Gloves are an indispensable safety tool. The type needed depends on the situation, but disposable vinyl gloves are the most versatile choice. Handling live animals requires thick, leather gloves; when applying certain chemicals, such as some pesticides, you may need to wear a specific type of gloves.

Goggles or similar eye protection are important in many circumstances.

As previously mentioned, *respirators* are a wise precaution in some situations.

Control strategies for some of the major pests of collections

These are general tips for preventing or controlling infestations by some of the major pests of paper-based collections. For more detailed information, refer to the enclosed materials and the resources listed at the end of this manual.

Please remember that some techniques that effectively kill insects, such as the use of heat or microwaves, may harm certain types of materials.

Your goal is to remove the resources pests need—food, water, and shelter—and to prevent them from getting into the area.

Clothes moths (Lepidoptera, family Tineidae)

- Good sanitation, including vacuuming and fabric cleaning, is important.
- Clean up any accumulation of animal and human hair (including in tight spaces such as behind and under baseboards).
- Air ducts, especially cold air returns, may provide harborage. Inspect them; clean if necessary.
- Dry-clean or wash fabrics (such as rugs or curtains) in hot soapy water.
- If carpeting is infested from underneath, the carpet may need to be removed for cleaning. Be sure to clean the carpet backing.
- Thoroughly clean fabric-covered furniture.
- Remove bird nests and wasp/hornet nests from the building.
- Red cedar heartwood paneling may be effective for a few years if the closets and chests are kept very tightly closed.
- Storing items in brown kraft paper, sealed bags, or sealed containers may help.
- Cold storage may prevent feeding, but it may not kill the larvae.

- All stages of clothes moths are killed by exposure to temperatures of at least -20°F for 72 hours or 105.8°F for 4 hours.
- Trap and remove rats and mice; don't poison them because you don't want the hair on their carcasses to attract clothes moths.
- To catch clothes moths, bait a sticky trap with a cotton ball that's had one side saturated in fish oil.
- Boric acid and desiccating dusts may be effective.

Cockroaches (Blattodea, various families)

- Eliminate stacks of cardboard, paper bags, and other clutter—especially in warm, moist locations.
- Empty garbage, compost, and recycling containers every evening. Wash trash cans often.
- Keep drawers, counters, appliances, floors, and walls scrupulously clean. Regularly clean underneath appliances and equipment. Check inside the equipment, too.
- Use a long spatula to clean those “grunge slots,” any cracks where food debris might collect.
- Store food in tightly sealed containers off the floor and away from walls, or keep it in the refrigerator.
- Empty refrigerator defroster pans often.
- Separate foods that aren't used frequently from those that are. Store them in different places.
- Rotate stock.
- Wash and dry dishes promptly. Wipe up spills immediately.
- Inspect items before bringing them into kitchen and other food areas.
- Do not keep recycled goods near the kitchen and food supply areas.
- Use vacuums with HEPA filters to clean up cockroaches, their body parts, and food. Seal the vacuum bag in a plastic bag before disposing of it.
- Sticky traps capture roaches.
- Repair water leaks. Seal gaps around pipes, tubs, drains, and sinks with a silicone sealant.

- Keep bathrooms as dry as possible.
- Seal other cracks and openings around vents, registers, ducts, and electrical chases, and gaps in cabinets and woodwork.
- Use wire metal shelves instead of wood shelves. Keep shelves clean.
- Clear vegetation and debris away from the foundation.
- Tighten doors, windows, and screens.
- Fix cracks in walls (inside and out) and floors.

Drugstore beetle (*Stegobium paniceum*)

- Sanitation and removal of infested materials is important.
- Maintain good ventilation to keep moisture levels low.
- All stages of drugstore beetles are killed by exposure to temperatures of at least 122°F for one hour, or -4°F for seven days.
- Pheromone traps are available. They are most effective when placed near windows or other light sources.
- Store food and other items in tightly sealed containers off the floor and away from walls, or keep it in the refrigerator.

Molds and mildews (mostly fungi)

- Eliminate or control water sources, including leaks and condensation.
- Check for blistering or peeling paint on the outside of buildings.
- Replace wood that's been damaged by water or fungi.
- Maintain good ventilation.
- Keep downspouts and gutters in good condition and make sure they're directing the water away from the building.
- Check for puddles and water sources underneath the building.
- If needed, use a sump pump in the basement.
- Waterproof the foundation.
- Borates are good anti-fungal preservatives.
- Periodically air out stored records.

- When constructing a new building, install vapor barriers on the surfaces of unexcavated soils beneath the building.

Mice and rats (Rodentia, families Muridae and Cricetidae)

- Store food, bird seed, pet food, garbage, compost, and recyclables in secure metal, glass, ceramic, or heavy-duty plastic containers with tight-fitting lids.
- Keep birdfeeding areas clean of spilled seed.
- Empty trash regularly and frequently.
- Clean garbage cans, dumpsters, and chutes regularly. Screen dumpster drainage holes with hardware cloth.
- Feed pets at scheduled times. Put unfinished food in the refrigerator.
- Promptly clean up spills and crumbs.
- Elevate compost piles or enclose them with 1/4 in. wire mesh.
- Remove cardboard boxes, or at least keep them and other stored items off the floor and away from walls.
- Reduce clutter.
- Move firewood, garbage cans, and debris piles away from the building.
- Keep vegetation trimmed back from the building and maintain a foot-wide gravel boundary around the foundation.
- Close all openings that are more than 1/4 in. wide.
- Keep doors closed.
- Use traps.
- Repair water leaks and do not allow water to stand overnight.

Booklice and psocids (Psocoptera, various families)

- Vacuum thoroughly.
- Keep humidity below 50%.
- Eliminate molds and similar infestations.
- Remove bark, leaf, and grass litter from around the building.

- Caulk or otherwise seal potential crack-and-crevice hiding places.

Silverfish and firebrats (Thysanoptera, family Lepismatidae)

- Control or eliminate moisture, including leaks and condensation.
- Keep the area cool and dry.
- Seal cracks and other openings, especially around shelves and other locations where records are kept.
- Remove potential food sources (proteins and carbohydrates).
- Dust wall voids and similar enclosed spaces with boric acid or desiccating dusts.
- One type of silverfish lives in mulch beds and under shingles.
- Vacuum thoroughly.
- Silverfish and firebrats are unable to climb smooth surfaces such as glass. Use glass jars with masking tape around the outside as traps.
- To detect a suspected infestation, use small cards with flour paste. If you find scales on the cards, you have an infestation.
- Maintain good ventilation.
- Firebrats prefer the warmth of heating pipes, ducts, and fireplaces.
- Heat and freezing treatments have been used for control.
- Microwave radiation for 30–60 sec. has been used to kill silverfish in books.
- Do not use cardboard boxes for long term storage.

Termites (Isoptera, various families)

- Eliminate direct contact between wood and soil.
- Keep wood (branches, boards, ornamental railroad ties, stumps) away from the foundation. Plant trees away from the building.
- Store firewood off the ground.
- Build with non-wood materials.
- Install special stainless steel mesh systems at any underground point where termites might

gain entry to the building. This has to be done during the construction and by trained technicians. Check local building codes.

- Reduce moisture level of wood.
- Install a sand, granite, or basalt barrier around the foundation.
- You may be able to dig out a very small termite colony that's located outside.
- Open termite earthen tubes.
- Allow ants to attack termites.
- Heat treatments have been effective in controlling drywood termites and some other wood-boring insects.

Resources

* This symbol indicates a comprehensive resource with an extensive bibliography or online links, a likely launch for your research.

Because of the national interest in reducing pesticide use on school property, many of the following resources have been oriented toward schools. However, the same principles and techniques are applicable to other public properties.

Books/Manuals/Binders/Guidelines

A Guide to Museum Pest Control. L.A. Zycherman and J. R. Schrock, eds. 1988. Foundation of the American Institute for Conservation of Historic and Artistic Works and Association of Systematics Collections, 730 11th St., NW, 2nd floor, Washington, DC. 20001. (202) 347-2850. 205 pp.

Approaches to Pest Management in Museums. K. O. Story. 1985. Smithsonian Institution. Available from: Conservation Analytical Laboratory, Smithsonian Institution, Suitland, MD 20746.

Bookworms: The Insect Pests of Books. N. Hickin. 1985. Sheppard Press Limited. 176 pp.

* Common-Sense Pest Control: Least-toxic Solutions for Your Home, Garden, Pets and Community. W. Olkowski, S. Daar, and H. Olkowski. 1991. The Taunton Press. 715 pp.
A must-read for anyone interested in least toxic pest control.

Disaster Response and Planning for Libraries. M. B. Kahn. 1998. American Library Association. 128 pp. . Society of American Archivists. 527 S. Wells St, 5th Floor, Chicago, IL 60607-3922. (312) 922-0140. Fax: (312) 347-1452. <www.archivists.org>.

Handbook of Household and Structural Insect Pests. R. E. Gold and S. C. Jones, eds. Entomological Society of America, 9301 Annapolis Rd., Suite 300, Lanham, Maryland 20706. (301) 731-4535.

Inert Gases in the Control of Museum Insect Pests. C. Selwitz and S. Maekawa. 1999. Getty Conservation Institute. 122 pp. Available from Society of American Archivists, . 527 S. Wells St, 5th Floor, Chicago, IL 60607-3922. (312) 922-0140. Fax: (312) 347-1452. <www.archivists.org>.

Integrated Pest Management Guidelines for Structural Pests: Model Guidelines for Training and Implementation. Structural work group of the Mass. IPM Council. University of Mass. Extension.

Integrated Pest Management in Chicago Public Housing: Horner and Beyond. Safer Pest Control Project. 25 E. Washington, Suite 1515, Chicago, IL 60602.(312) 641-5575. Email:spcp@iname.com. An information packet is available which describes an ingenious approach to least toxic pest control in approximately 1000 units at the Henry Horner Homes public housing development in Chicago.

Integrated Pest Management in Museum, Library, and Archival Facilities: A Step by Step Approach for the Design, Development, Implementation, and Maintenance of an Integrated Pest Management Program. J. (978) 470-1010. Fax: (978) 475-6021 <www.nedcc.org/plam3/manhome.htm>.

Pest Control Technician Safety Manual. L. Pinto and S. Kraft. 2000. Pinto & Associates, Maryland.

Preserving Archives and Manuscripts. M. L. Ritzenthaler. 1993. Society of American Archivists. 527 S. Wells St, 5th Floor, Chicago, IL 60607-3922. (312) 922-0140. Fax: (312) 347-1452. <www.archivists.org>. 225 pp.

* Truman's Scientific Guide to Pest Control Operations, 5th ed. 1997. G. W. Bennett, J. M. Owens, and R. M. Corrigan. Purdue University/Advenstar Communications.

Urban IPM Handbook: An integrated approach to management of pests in and around structures. National Pest Management Association, 8100 Oak Street, Dunn Loring, Virginia 22027. (703) 573-8330.

Wisconsin's School Integrated Pest Management Manual, School pilot program draft. J. C. Stier, K. Delahaut, P. Pellitteri, and B. Becker.
<<http://ipcm.wisc.edu/programs/school/default.htm>>.

Online courses/Notable websites

✳ Conservation Online (CoOL)
<<http://palimpsest.stanford.edu>>

A broad, deep collection of preservation information and links. Also contains the archives of the online preservation discussion group, "Conservation DistList."

Here are a few highlights from this site:

Jessup, Wendy Claire. "Integrated Pest Management: A Selected Bibliography for Collections Care." February 1997. An excellent annotated bibliography that covers museum, library, and archival pests; the effects of pesticides and other eradication techniques on collections; and occupational safety and health. Available at <<http://palimpsest.stanford.edu/byauth/jessup/ipm.html#sec1>>.

Pests, Insects, and Fungus Management: Nontoxic Fumigation and Alternative Control Techniques for Preserving Cultural/Historic Properties and Collections, sponsored by *Technology and Conservation* and Harvard University's Environmental Health and Safety Department, Oct. 22-23, 1994). Conference notes available at <<http://palimpsest.stanford.edu/byauth/motylewski/pestnote.html>>.

Extension Toxicology Network (Ex Tox Net)
<<http://ace.orst.edu/info/extoxnet>>
Provides pesticide information profiles

Institute of Paper Conservation
<<http://palimpsest.stanford.edu/ipc>>

The National Park Service IPM Manual, 2nd ed.
<http://www.nature.nps.gov/wv/ipm/manual.htm>
Online modules about the biology and management of 21 categories of structural and landscape pests, including museum pests.

✳ NYS Integrated Pest Management (IPM) Program
<<http://nysipm.cornell.edu>>
Includes the *IPM Workbook for New York State Schools*, many fact sheets about pests, a catalog of IPM resources, and many links.

✳ Preservation 101: An online course on paper conservation.

<www.nedcc.org/p101s/p101arch.htm>.
Created by the National Center for Preservation Technology and Training and the National Park Service. Topics: paper preservation; environmental damage to collections; practical methods for improving storage conditions; emergency preparedness; care of photographs; preservation planning.

Preservation Calculator:
<www.rit.edu/~661www1.sub_pages/frameset3.html>.

Free software produced by the Image Permanence Institute of the Rochester Institute of Technology that estimates the lifespan of your collection and how quickly mold will grow under your current storage conditions, based on your temperature and relative humidity figures.

✳ School IPM website:
<www.ifas.ufl.edu/~schoolipm/>.
An excellent resource, part of the National IPM Network.

✳ SOLINET Preservation Services
Southeastern Library Network, Inc., 1438 W. Peachtree St. NW, Suite 200, Atlanta, GA 30309-2955. (800) 999-8558. Fax (404) 892-7879.
<<http://www.solinet.net/presvtn/preshome.htm>>.
Articles and leaflets on many preservation topics, and extensive bibliographies.

A Virtual Exhibition of the Ravages of Dust, Water, Moulds, Fungi, Bookworms and other Pests. May 1996. European Commission on Preservation and Access and The Library of The Royal Netherlands Academy of Arts and Sciences. <<http://www.knaw.nl/ecpa/expo.htm>>.
Excellent photographs of books and other papers damaged by pests.

Journals/Serials/Newsletters

Abbey Newsletter. Ellen McCrady, ed. 7105 Geneva Drive, Austin, TX 78723.
<<http://palimpsest.stanford.edu/byorg/abbey/>>.
Preservation and conservation subjects, news, book reviews, lists of publications.

Archival Outlook. Society of American Archivists. 527 S. Wells St, 5th Floor, Chicago, IL 60607-3922. (312) 922-0140. Fax: (312) 347-1452. <www.archivists.org>.

Their bimonthly newsletter, which includes international news.

American Archivist. Society of American Archivists. 527 S. Wells St, 5th Floor, Chicago, IL 60607-3922. (312) 922-0140. Fax: (312) 347-1452. <www.archivists.org>.

Their journal, which includes essays on archival science and international archival practices; case studies; and book reviews.

Basic Manual Series and Archival Fundamentals Series. Society of American Archivists, 600 South Federal Street, Suite 504, Chicago, IL 60605. <www.archivists.org/catalog/catalog/index.html>.

Discusses basic archival functions such as accessioning; appraisal; arrangement and description; reference and access; security; reproduction; and conservation.

CLIR Issues. Council on Library and Information Resources, Commission on Preservation and Access, 1755 Massachusetts Avenue, NW, Suite 500, Washington, D.C. 20036-2188, (202) 939-4750, <www.clir.org/pubs/issues/issues.htm>.

Includes a section with preservation and access related articles; focus is on digital initiatives. Issues are available online.

Conservation. Jeffrey Levin, ed. Getty Conservation Institute, 1200 Getty Center Dr, Suite 700, Los Angeles, CA 90049-1684. (310) 440-7325. <http://web1.getty.edu>.

The newsletter of the Getty Conservation Institute about conservation practices in the visual arts. Includes feature articles, list of publications and videos, events calendar.

Conserv-O-Gram series. National Park Service, Curatorial Services Division, Harpers Ferry, WV 25425. (202) 512-1800. Fax: (202) 512-2250. <www.cr.nps.gov/csd/publications/conservoogram/conserv.html>.

Detailed technical leaflets on a broad range of museum management topics such as environmen-

tal conditions, housekeeping, storage and handling, and health and safety. Discusses preservation for different objects, including biological specimens and paper. Available in a binder or as pdf files.

The IPM Practitioner. Bio-Integral Resource Center, P.O. Box 7414, Berkeley, CA 94707. (510) 524-2567. <www.birc.org>.

Library Resources and Technical Services. Association of Library Collections and Technical Services, American Library Association, 50 East Huron Street, Chicago, IL 60611. (800) 545-2433.

<www.ala.org/alcts/lrts/>.

Peer-reviewed articles on the latest technical developments, editorials, and book reviews.

WAAC Newsletter. Western Association for Art Conservation, Publication Order c/o Chris Stavroudis, 1272 North Flores Street, Los Angeles, CA 90069. (213) 654-8748.

<http://palimpsest.stanford.edu/waac/wn/>.

Contains feature articles, regional news, technical exchange, an events calendar, conference reviews, and a publications section. WAAC also has a directory that lists more than 400 manufacturers and suppliers of conservation related materials.

Technical reports/Articles

Butcher-Youngans, S., and G. E. Anderson. 1990. A Holistic Approach to Museum Pest Management. American Association for State and Local History (AASLH) Technical Leaflet 191. Nashville, TN: AASLH. Can be ordered through <www.aaslh.org> or AASLH, 530 Church Street, Suite 600, Nashville, TN 37219-2325. (615) 255-2971.

Lyall, J. 1996. "Disaster Planning For Libraries And Archives: Understanding The Essential Issue." *Provenance: The Electronic Magazine*. Available at <www.nla.gov.au/nla/staffpaper/lyall1.html>.

Presented by Dr Jan Lyall, Director, Nat. Preservation Office, at the Pan-African Conference on the Preservation and Conservation of Library and Archival Materials, Nairobi, Kenya: 21-25 June 1993.

Odegaard, N. 1991. "Insect Monitoring in Museums"; and D. P. Kronkright. "Insect Traps in Conservation Surveys." Both in *WAAC Newsletter*

vol. 13, # 1: 19-23. Both articles offer tips for monitoring insect populations using various types of traps. Available online at:
<<http://palimpsest.stanford.edu/waac/wn/>>.

Wellheiser, J. G. 1992. *Nonchemical Treatment Processes for Disinfestation of Insects and Fungi in Library Collections*. Munich: K.G. Saur, 118 pp. Review of pest management techniques used in libraries, including fumigation, freezing, gamma radiation, microwaves, and modified atmospheres. Includes information about the risks, benefits, and costs of each treatment and results reported by various institutions.

Wilson, W. K. 1995. *Environmental Guidelines for the Storage of Paper Records*. National Information Standards Organization Technical Report (NISO-TR01-1995). Bethesda, MD: NISO Press. Available from NISO Press, P.O. Box 338, Oxon Hill, MD, 20750-0338; 1-800-282-NISO and at <http://www.techstreet.com/cgi-bin/detail?product_id=52641>. Recommendations for temperature, relative humidity, light levels, and air quality. Detailed literature review.

Organizations

American Association of Museums
1575 Eye St, NW, Suite 400, Washington, D.C. 20005. (202) 289-1818. Fax: (202) 289-6578.
<<http://www.aam-us.org>>.

American Library Association
50 E. Huron, Chicago, IL 60611. (800) 545-2433.
<<http://www.ala.org>>.
Has an extensive publications catalog. Preservation information available from the Preservation and Reformatting Section (PARS) of the Association of Library Collections and Technical Services (ALCTS) Division.

American National Standards Institute (ANSI)
1819 L St. ,NW , Washington, D.C. 20036. (202) 293-8020. Fax: (202) 293-9287.
<www.ansi.org>.
Facilitates the development of voluntary standards for many industries.

American Society of Heating, Refrigerating, and Air-conditioning Engineers
1791 Tullie Circle, NE, Atlanta, GA 30329. (404) 636-8400. <www.ashrae.org>. Information about products, research, and standards.

Bio-Integral Resource Center (BIRC)
P.O. Box 7414, Berkeley, CA 94707. (510) 524-2567. <www.birc.org>.
Publishes the journal *The IPM Practitioner*.

Beyond Pesticides/National Coalition Against the Misuse of Pesticides (NCAMP)
701 E Street SE, Washington, DC 20003. (202) 543-5450.
<www.beyondpesticides.org>.

Cornell Cooperative Extension
See enclosed list of regional offices.

Council on Library and Information Resources
1755 Massachusetts Ave. NW, Suite 500, Washington, D.C. 20036. (202) 939-4750.
<www.clir.org>
Fosters collaborations among libraries and archives, focusing on preservation, access, and technological challenges, and manages the Digital Library Federation.

Department of the Environment,
City and County of San Francisco
1540 Market Street, Suite 160, San Francisco, CA 94102. (415) 554-6390.
Email: Environment@ci.sf.ca.us.
<www.ci.sf.ca.us/environment>.
Developed the first Pesticide Sunset Ordinance in the United States.

Environmental Advocates
353 Hamilton Street, Albany, NY 12210. (518) 462-5526. <www.envadvocates.org>.

Foundation of the American Institute for Conservation
1717 K Street, NW, Suite 301, Washington, D.C. 20006. (202) 452-9545. FAX (202) 452-9328.
<<http://palimpsest.stanford.edu/aic/>>.
Will provide a list of professional conservators in your area.

Getty Conservation Institute
1200 Getty Center Dr, Suite 700, Los Angeles, CA
90049-1684. (310) 440-7325.
<<http://web1.getty.edu>>.

Maintains a large library of conservation and preservation literature, which can be searched online. Also has many trade catalogs for equipment vendors and service providers.

Institute of Museum and Library Services
1100 Pennsylvania Ave., NW, Washington, D.C.
20506. (202) 606-8536. <www.imls.fed.us>.
A federal grantmaking agency.

Library of Congress
Preservation Directorate, 101 Independence Ave.,
Washington, D.C. 20540-4500. (202) 707-5213.
< www.loc.gov/preserv >
Contains information about its preservation program, including preservation leaflets, and its extensive digital collections and programs.

National Archives and Records Administration
201 Varick St., New York, NY 10014-4811. (212)
337-1300. <www.nara.gov>.
National network with facilities in 18 states. Website contains information on archival preservation and management, training opportunities, professional organizations. Also includes the Federal Register, full text of federal laws.

✱ National Park Service
—Museum Management Program, 1849 C St. NW,
room 230NC, Washington, D.C. 20240. (202) 343-
8142; Fax (202) 343-1767.
—Museum Resource Center: <www.nps.gov/mrc>
—National Center for Preservation Technology and
Training: <www.cr.nps.gov/ncptt>
Excellent publications on a broad range of
preservation topics, including their *Museum
Handbook*, a guide on how to manage, preserve,
document, access, and use museum collections; the
NPS IPM manual; and the “Conserv-o-gram”
series of technical leaflets. Created an online course,
“Preservation 101.”

National Information Standards Organization
(NISO)
4733 Bethesda Ave Suite 300, Bethesda, MD 20814.
(301) 654-2512. <www.niso.org>.

Accredited by ANSI, this organization develops technical standards for information services industries to help them achieve compatibility between equipment, procedures, and data. NISO Press features publications about preservation planning, digital libraries, preservation and storage, including NISO TRO1-1995, “Environmental guidelines for the storage of paper records,” and “Environmental conditions for the exhibition of library and archival materials.”

New York Coalition for Alternatives to Pesticides
(NYCAP)
353 Hamilton Street, Albany, NY 12210. (518)
426-8246. E-mail: nycap@crisny.org.
<www.crisny.org/not-for-profit/nycap/nycap.htm>.

New York Public Interest Research Group
(NYPIRG)
107 Washington Avenue, Albany, NY 12210. (518)
436-0876. < www.nypirg.org >.

New York State Archives and Records
Administration (SARA)
NYS Education Department, Office of Cultural
Education, Albany, NY 12230.
<www.sara.nysed.gov>.
Information about grants for local government
records management, guidelines and laws about
records retention, workshops, records management
software, and many online publications.

New York State Library
Cultural Education Center, Empire State Plaza,
Albany, NY 12230. (518) 474-5355.
<www.nysl.nysed.gov>.

✱ New York State Integrated Pest Management
(IPM) Program
NYSAES, Geneva, NY 14456-0462. (315) 787-
2353. (800) 635-8356. Fax: (315) 787-2360.
<<http://nysipm.cornell.edu/>>.
Email: nysipm@cornell.edu.
Web site includes the *IPM Workbook for New York
State Schools*, many pest fact sheets, and links.

* Northeast Document Conservation Center
100 Brickstone Square, Andover, MA 01810-1494.
Tel: (978) 470-1010. Fax: (978) 475-6021.
<www.nedcc.org>.

Site includes a pdf version of their manual, *Preservation of Library and Archival Materials*, list of suppliers of pest management equipment, extensive bibliographies, and links to other resources.

Northwest Coalition for Alternatives to Pesticides (NCAP)
PO Box 1393, Eugene, Oregon 97440. (503) 344-5044. <www.enf.org/ncap or www.pesticide.org>.

Pesticide Action Network of North America (PANNA)
(415) 981-1771. <www.panna.org/panna>

Pesticide Watch
450 Geary Street, Suite 500, San Francisco, CA 94102. (415) 292-1486. <www.pesticidewatch.org>.

* Society of American Archivists
527 S. Wells St, 5th floor, Chicago, IL 60607-3922.
(312) 922-0140. Fax: (312) 347-1452.
<www.archivists.org>.

Publishes *Archival Outlook*, a newsletter, and *American Archivist*, a journal, the *Basic Manual Series and Archival Fundamentals Series*, and many brochures and reports. Offers a comprehensive catalog of publications for sale and workshops.

Smithsonian Institution, Conservation Analytical Laboratory
MSC, MRC 534, Washington, D.C. 20560. (301) 238-3700. <www.simsc.si.edu/cal/>.
Conducts preservation research. Offers training and many publications.

Listservs

Unless otherwise noted, you can subscribe by sending a one line e-mail reading "Subscribe LastName YourFirstName YourLastName" to the server account address listed below (do not include the quotation marks).

For example:

subscribe ARCHIVES Jane Doe
sent to listserv@miamiu.muohio.edu.

Many listservs include information about how to subscribe and withdraw from the list at the bottom of every posted message. You can also contact the listserv administrator for information.

ARCHIVES *listserv@miamiu.muohio.edu*
Archives

CONSERVATION DISTLIST
consdist-request@lindy.stanford.edu
Preservation and conservation.
"Subscribe Cons DistList Your Name"

DIGLIB *listserv@infoserv.nlc-bnc.ca*
Creation of digital libraries.

ERECS-L *listserv@uacsc2.Albany.edu*
Management and preservation of electronic records.

EXLIBRIS *listproc@library.berkeley.edu*
Rare books and special collections.

IMAGELIB *listserv@arizona.edu*
Digital imaging and technologies.

PADG *listproc@ala.org*
Preservation administrators discussion group.

PRESED-L *listproc@ala.org*
Preservation education.