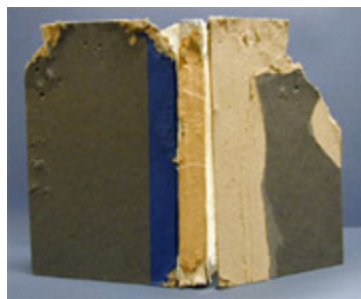


IMPLEMENTATION OF AN INTEGRATED PEST MANAGEMENT PROGRAM FOR DEPARTMENTAL LIBRARIES



PHILOSOPHY

Integrated pest management (IPM) is a proactive program, utilizing techniques that minimize or even eliminate the use of chemicals, that is designed to determine whether there is a pest problem that needs to be addressed or whether there are buildings maintenance or operation issues that need to be improved to reduce the likelihood of an infestation in the future. IPM is preferred to chemical spraying for several reasons. First and foremost, researchers are discovering that a wide variety of chemicals found in pesticides can have a disruptive effect on a person's neurological, respiratory, immune, and endocrine systems, even at relatively low dosages. Decreased use of chemical application will reduce risks to the health of staff members. Also, pesticides, particularly those in oil-based solutions, will chemically interact with paper, film and digital media. Decreased use of chemical applications will reduce the risk of deterioration and disfigurement of holdings.

A fully operational integrated pest management system consists of three steps: **monitoring, assessment, and treatment.**

MONITORING

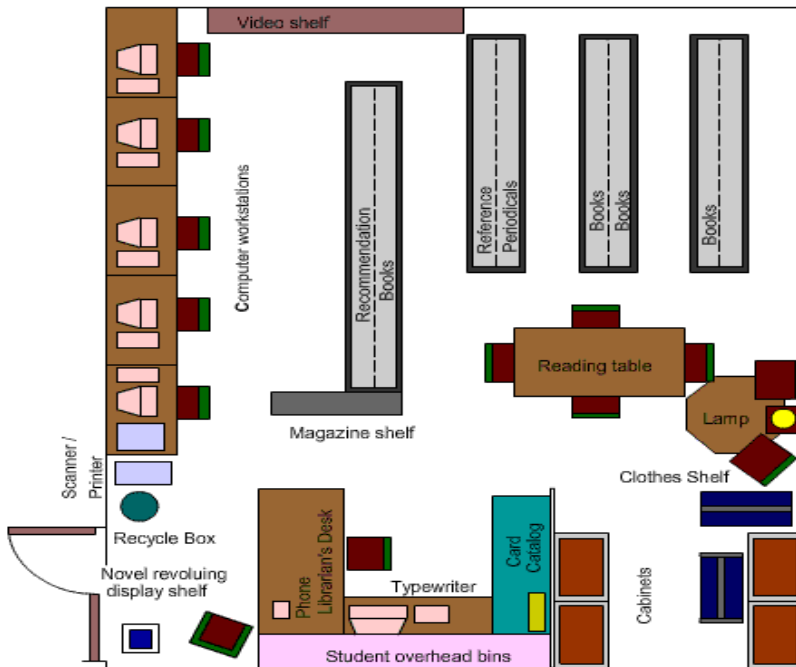
The first step in setting up an IPM program is to determine the level of insect activity in the collection. Although a small amount of insect activity is inevitable and acceptable, a large population of destructive pests can be extremely threatening to the collection. Insect activity is best observed by trapping insects and recording their presence. Departmental libraries at UIUC can obtain free glue traps from the pest & animal control division of Facilities and Services www.fs.uiuc.edu. The University of Illinois purchases Protecta® Pest Monitors which are reusable, plastic monitoring boxes used to monitor for both mice and insects.



PLACEMENT OF TRAPS

Traps should be labeled (date/location) and placed methodically around the collection space with their locations denoted on a floor plan. Invertebrate pests are attracted towards sources of natural light and/or gravitate towards water and food sources. In addition, traps should be placed in pest runways - along baseboards or window edges. Therefore, traps should be placed near or in the following locations with glue traps parallel to the wall:

- Drains and water sources
- Points of entry to the building (doors, windows, air vents)
- Any place where food is routinely present
- Floors below ground level



The number and spacing of the traps will be decided by the square footage of the library and the risk of infestation. For example, the Spurlock Museum at the University of Illinois has 91 traps throughout the building. There is approximately 1 trap per 400 square feet of space in areas with a high risk of infestation. There is approximately 1 trap per 1000 square feet in areas with a low risk of infestation. At the outset, it is recommended to place a large number of traps throughout the facility and allow them to remain in the same location for a year of seasonal change. Additional traps may be added in specific locations where a high insect activity is detected, but generally traps should not be removed until inactivity is confirmed over a one year period.

TRACKING PROGRESS

A collections staff member should be assigned to the responsibility of performing routine IPM monitoring. This will ensure a regularity and centralized authority for the quality control of the program. In the beginning, monitoring of the traps should be made frequently (every two days for the first week and then once a week for the first 12 weeks) to determine what areas of the collection are most endangered. Once the program has begun traps should be collected on a scheduled basis, roughly every 3-5 weeks. In order to collect these findings, a database should be developed using Access or an Excel spreadsheet (a downloadable template can be found at www.museumpests.net/pestmanager.htm).

The database should record the following data for each trap:

- The trap/ID location
- The date the pest was found (or the dates the trap was set for)
- The type of pest(s) that was found, and the number
- Any descriptive notes pertaining to the environment around the trap (leaks, etc).

These records, over a series of trapping cycles, will show if there are areas that should be watched more closely. In addition, through generating reports and charts over a period of time, they may also provide the annual cycle of insect populations within the library so that preparations and staff awareness can help to guard against increases in populations.

Identification of insects can be performed through field guides, IPM guidebooks, or internet sources (SEE [FIELD GUIDES & INSECT IDENTIFICATION RESOURCES](#)). As you begin to identify insects it will be important to maintain a reference collection which has been accurately identified. A reference collection will help you with future identification and allow you to teach others what pests are commonly found in your institution. Once the information has been recorded, full traps should be replaced with a clean trap (labeled and dated) and live specimens can be released or disposed of properly. Dead specimens and used traps should be disposed of, preferably outside the facility.

Sometimes live rodents may walk over the glue trap and stick instantly, unable to budge. This is both cruel to the rodent and unsanitary for humans (as trapped mice urinate and defecate on the trap out of fear, creating a potential health problem for humans). If you discover live rodents on a glue trap, you can loosen the glue and safely release the trapped animal outside the facility. Wearing gloves, add vegetable oil to neutralize the glue and, with a pencil, gently push the rodent off the trap.

ENVIRONMENTAL MONITORING

In addition to monitoring pest activity, knowing the changes in environmental conditions can help to prevent infestations. Insects can only proliferate if the environment is conducive to breeding and hatching. Illinois, in particular, is a state with relatively high humidity in the spring and summer months (April through September). Elevated relative humidity (RH) correlates to an increased risk of mold infestation. Similarly, elevated RH and temperature correlate to an increased risk of invertebrate pest infestations. Ideally, RH should be below 50% so as not to favor insect population.

Currently, the UIUC Preservation and Conservation Program's environmental monitoring program is employing two types of monitoring equipment: stand alone hygrothermographs and data loggers that download into the Climate Notebook software developed

by the Image Permanence Institute http://www.library.uiuc.edu/prescons/environment_monitoring.html. Climate Notebook participating departmental libraries will receive room condition reports alerting them to temperature and relative humidity. Necessary adjustments to RH and temperature can be reported to facilities and services and environmental factors can be modified to make the collection space less favorable to the insect growth cycle. Additional libraries wishing to monitor temperature and RH may borrow hygrothermographs and receive a free tutorial from a staff member at:

Conservation Lab
Oak Street Library Facility, 2nd Floor
809 South Oak Street
Ph: 217-265-4198

TREATMENT OPTIONS

A majority of insect activity within a library can be eliminated through proper habitat modification. Although the university library already has a policy restricting food and drink consumption and preparation to a specific area of the building, it is imperative that a food and drink policy be enforced. In areas where food is allowed, good housekeeping is essential. This area should have a regular cleaning schedule to help reduce the risk of invertebrate pest infestation and garbage receptacles should be tightly sealed and removed daily to remove food sources for pests. In addition to food and drink, plants should not be allowed anywhere in the collection area or in staff offices. Wet soil and dead plant matter can all lead to supporting insect populations. Unfortunately, creating strategy is easy, but implementing it is very difficult. Nevertheless, a properly modified habitat will decrease the risk of an infestation and prevent it from swelling in numbers if an infestation does occur.



SMALL INFESTATION

If an increase in insect activity is located in a particular section of the collection, isolate the infested material as quickly as possible. Remove the infested section away from the rest of the collection and place items in small sealable plastic bags. In order to kill all life stages of the insects, the materials should be labeled and sent to the Conservation Lab at the Oak Street Library Facility for blast freezing treatment. Although most items can withstand blast freezing, some materials are too fragile and may be damaged in the process, therefore blast freezing may not be appropriate for all infested library materials.

LARGE INFESTATION

If local blast freezing is not a possibility, eradication of the insect infestation is most likely accomplished by chemical control and applied through the University of Illinois Facilities and Services Department (UI F&S). The use of any substance (especially insecticide) directly on collection materials is not recommended. Generally, invertebrate infestations are not controlled chemically unless they present a significant and immediate danger to the building or the collections. However, silverfish, beetle, termite and

cockroach infestations should be chemically controlled as soon as possible, as these organisms may pose significant risk to any collection. Before treated materials are returned to the collection, the infested area should be thoroughly cleaned of all debris.

SUPPLIER FOR IPM MATERIALS & CONSULTING

As previously mentioned, Facilities and Services can provide numerous types of traps, including both live-catch and kill. However, here is a short list of suppliers and consultants for more resources. Also, additional information on identification, temperature and RH monitoring, and placement of traps can be obtained by contacting the Preservation and Conservation Units.

Preservation Unit

44 Library, MC-522

University of Illinois at Urbana-Champaign Library

1408 West Gregory Drive

Urbana, IL 61801

Thomas Teper

Head of Preservation

Ph: 3-0318

Conservation Unit

Oak Street Library Facility, 2nd Floor

809 South Oak Street

Mail Code 527

Champaign, IL 61820

Jennifer Hain Teper

Head of Conservation

Ph: 244-5689

INSECTS LIMITED

www.insectslimited.com

Insects Limited, Inc. researches, tests, develops, manufactures, and distributes pheromones for stored food insects throughout North America and in over 30 countries worldwide. Insects Limited, Inc. specializes in a unique niche of pest control that started out as an idea and has developed into a business that provides a range of products and services that are becoming mainstream in protecting stored food, grain, tobacco, timber, museums and fiber worldwide.

PEST CONTROL SOLUTIONS

www.pestcontrol-products.com

Pest Control Solutions distributes professional supplies for residential and commercial control of pests for every type of insect and rodent. In addition, this site contains useful links with more pest control information on pest management.

INTEGRATED PEST MANAGEMENT WORKING GROUP

www.museumpests.net

This site is a service of the Integrated Pest Management Working Group, a group of collection managers, conservators and other professionals interested in issues surrounding the implementation of integrated pest management in museums and other collection-holding institutions. The group is informally hosted by the American Museum of Natural History in New York and meets on an ad-hoc basis. The goal of the group is to promote and facilitate good IPM practices and collaboration between staff and institutions through the development and on-line distribution of training materials and other resources. The group also maintains the IPM mailing list to provide a forum for discussion of IPM-related topics.

PEST CONTROL SERVICES, INC.

www.termitesonly.com

Pest Control Services, Inc is nationally recognized as the first entomological consulting practice in the structural pest control industry. It is devoted to providing technical consultation and training in a variety of entomological disciplines. In addition, PCS conducts workshops for pest control firms and associations, food processors, state and federal agencies, museum and library professionals, and others involved in the prevention and control of pests and mold outbreaks.

FIELD GUIDES & INSECT IDENTIFICATION RESOURCES

There are numerous resources, both in print and on-line, available for the proper identification of insects and pests beyond those listed here. In addition, the department of Entomology at the University of Illinois is an excellent resource for difficult to identify insects. You can email their outreach coordinator Jamie Zahniser (zahniser@uiuc.edu) with your questions, and he'll try answers your questions.

BUG GUIDE (www.bugguide.net)

More than just a clearinghouse for information, this site helps expand on the natural histories of insects. By capturing the place and time that submitted images were taken, they are creating a virtual collection that helps define where and when things might be found. A clickable guide of identification makes this site a great resource for beginners.

A FIELD GUIDE TO INSECTS (White, Richard E. and Donald J. Borror. A Field Guide to Insects. Second Edition. New York: Houghton Mifflin., 1998).

Detailed descriptions of insect orders, families, and many individual species are illustrated with 1,300 drawings and 142 superb color paintings. Illustrations - which use the unique Peterson Identification System to distinguish one insect from another - include size lines to show the actual length of each insect. A helpful glossary explains the technical terms of insect anatomy.

NATIONAL AUDUBON SOCIETY FIELD GUIDE TO NORTH AMERICAN INSECTS AND SPIDERS (National Audubon Society. National Audubon Society Field Guide to North American Insects and Spiders. New York: Knopf, 1980.)

Spiders, bugs, moths, butterflies, beetles, bees, flies, dragonflies, grasshoppers, and many other insects are detailed in more than 700 full-color photographs visually arranged by shape and color. Descriptive text includes measurements, diagnostic details, and information on habitat, range, feeding habits, sounds or songs, flight period, web construction, life cycle, behaviors, folklore, and environmental impact. An illustrated key to the insect orders and detailed drawings of the parts of insects, spiders, and butterflies supplement this extensive coverage.

PEST MANAGEMENT IN MUSEUMS, ARCHIVES, AND HISTORIC HOUSES (Pinniger, David. PEST MANAGEMENT IN MUSEUMS, ARCHIVES, AND HISTORIC HOUSES. Denbigh, Clwyd : Archetype Publications., 2001).

The book begins with an introduction on what insects are and why they should be a cause for concern. The author compares pests in museums to those in commercial and industrial premises and gives clear descriptions, accompanied by drawings, of the structure of insects and life cycles of the most common museum pests. The second part classifies pests by the damage they cause rather than by taxonomic features.