

Integrated Pest Management

Principles, Protocols, and Accountability

I. Purpose of this Document

Cal Poly Humboldt's Integrated Pest Management Plan is intended to outline the philosophical underpinnings, objectives, and standards of practice in pest control for the University. This document strives to inform decision makers, Grounds Department staff, and the broader community of the University's commitment to safe, ecologically responsible, economical and effective pest control practices.

Introductory Statement

Cal Poly Humboldt operates according to the recognized principles and practices of Integrated Pest Management (IPM) across all of its properties and land holdings. The University is committed to the ecological, social, and economic objectives encapsulated in the IPM framework. Relevant staff are adequately trained and held accountable for appropriate implementation of IPM principles, as described in section IV below.

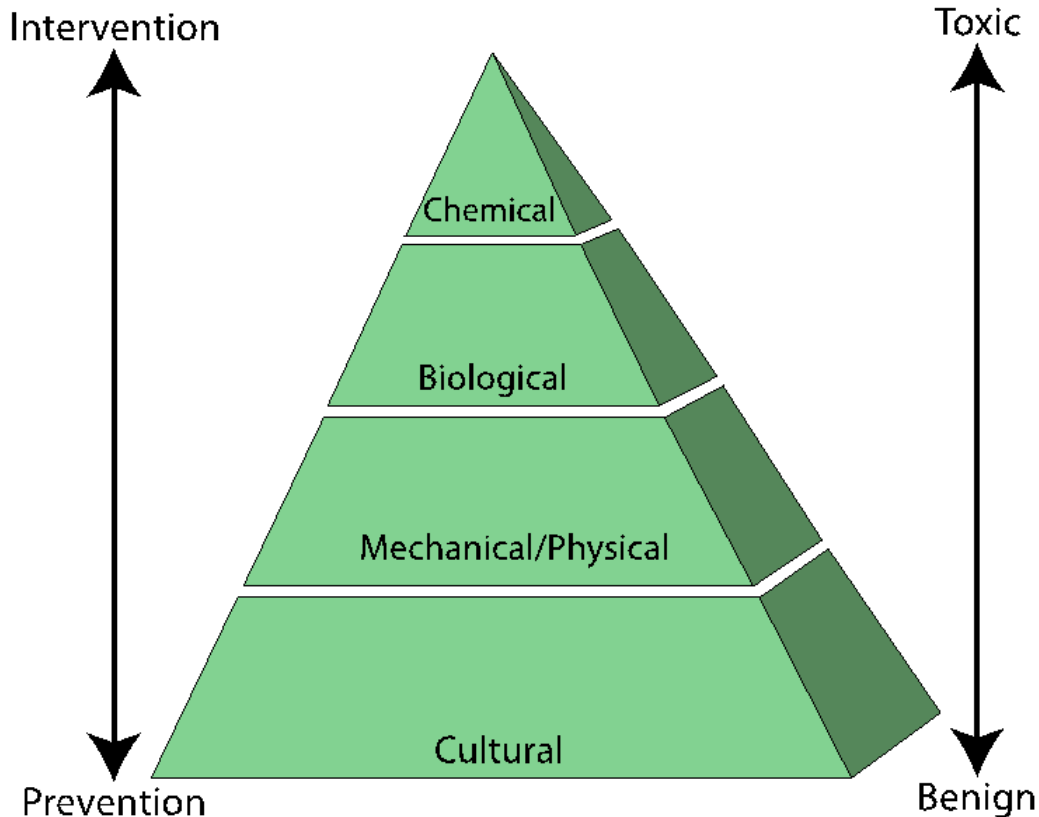
II. IPM Terms & Applied Concepts

Integrated Pest Management (IPM) - a strategic and comprehensive ecosystem based approach to pest management that focuses on the prevention of pest damage through a reliance on natural processes and a tiered series of management practices.

Preventative measures are the foundation of IPM and precede reactive interventions. Cultural practices, ongoing monitoring, and mechanical interventions are the normative daily management practices within the IPM framework. Biological interventions supplement these management practices when appropriate. Pesticides are used only when the efficacy of other management practices is exhausted and monitoring indicates a need according to established guidelines. Chemical treatments are made with the goal of narrowly focusing on the target organism. Pest control materials are selected and applied in a manner that minimizes risk to human health, beneficial and non-target organisms, and the environment.

The following graphic illustrates the escalating nature of management practices within the IPM framework. The primary focus is on prevention of pests through appropriate cultural practices. If, after due attention to appropriate preventative cultural practices, monitoring indicates the presence of pests at unacceptable levels, then mechanical techniques are deployed to address the problem. If mechanical techniques prove inadequate, biological interventions may be deployed. If cultural, mechanical, and

biological control techniques are exhausted and pests persist at unacceptable levels, chemical interventions may be deployed.



The principles of IPM, beginning in the 1970's, were first developed within agricultural systems and have subsequently been expanded to apply in all of the various settings where humans interact with other organisms in a way that is considered undesirable for humans. From the 1990's onward, IPM principles and practices have been mainstreamed in landscape management; residential pest control (ex. rats, bedbugs, mildew); structural pest control (ex. termites, carpenter bees, dry rot); and all other areas where pests can be a regular problem. Much of the language and focus of this document is situated specifically in IPM for landscape management. Landscape pest management is often the most visible manifestation of pest management on a university campus and serves as the foundational exemplar of IPM principles and practices. Though this document deals primarily with IPM in the landscape, these principles apply across the University in all pest management situations.

Cultural Practices - design choices and landscape maintenance standard operating practices that preemptively reduce the likelihood of pest problems. Examples include

but are not limited to, selecting disease resistant, native and climate adapted varieties of plants; preparing and maintaining the planting site with appropriate drainage, water availability, and exposure for the selected plants; mulching beds to inhibit the establishment of weeds; pruning woody plants as appropriate to increase overall health and vigor; seasonally removing excess accumulations of organic debris so as to limit harborage for diseases and insect pests; fertilizing with compost or other organic fertilizers so as to gain the full benefit of the biological complexity of locally produced live materials; removing weeds whenever possible before they have a chance to set seed; planning for and mitigating building impact on landscape environments such as downspout location, exhaust ventilation, etc. Pest-wise cultural practices such as these are standard default practices throughout the landscape. These preventative practices set the conditions for reduced pest problems and limit the need for more reactive pest control measures.

Monitoring - the regular systematic assessment of plant and soil health by landscape care professionals (ie. the University Grounds department) helps identify pest problems early before they get out of control. Early identification prevents pest problems from becoming more costly and requiring more extensive and disruptive interventions. Each area of the campus is assigned to the direct oversight of a trained landscape professional who monitors plant health and emerging pest concerns as part of their daily routine. Through many years of accumulated experience the Grounds department staff have become familiar with typical, seasonally recurring pest issues and can often anticipate needed responsive actions (see [Cal Poly Humboldt Landscape Management Practices document](#), "Pest Management page 31"). If novel or unexpected pest problems arise, the Grounds department professional staff may make use of additional available resources for pest identification and response assessment. The Grounds department may draw on the considerable expertise and resources of Cal Poly Humboldt Botany, Plant Pathology, and Entomology faculty as well as the Humboldt County UC Cooperative Extension Pest Control Advisor and the UC IPM website for assistance in diagnosis and the formulation of an appropriate action plan.

Occasionally pest concerns will come to the attention of Grounds department professional staff when reported by other members of the campus community. These concerns are responded to with appropriate dispatch. Identified pest problems are noted in the Grounds department work management system.

Action Threshold - pest population level at which the pest presence is determined to be a significant nuisance, a health hazard, or a meaningful threat to University resources. The IPM framework acknowledges that in a healthy, balanced ecosystem there will always be some pest presence. Incidental occurrences of pests are most often

not cause for immediate intervention but rather for continued monitoring and the clarification of an action threshold. In the agricultural setting in which IPM was first pioneered, action thresholds are commonly expressed in terms of economic impact. In the landscape, residential, and structural settings which are more relevant to the University however, other ways of measuring impact can be more appropriate. For example, it is difficult to assign a purely economic value to the nuisance and health impact of fleas in a residential setting. Similarly, it is practically impossible to assign a purely economic value to irreplaceable plant specimens in the University's world-class botany collection, some of which are critically endangered. While economics are always a factor, many pest management decisions in the University setting take other less concrete values into account (ex. aesthetics, educational value, ecological or botanical significance, iconic heritage specimens, etc.) to determine management priorities and thresholds for intervention.

Generally action thresholds are determined by individual trained landscape professionals in the field in consultation with their professional peers and their direct supervisor in the Grounds shop. In novel cases, high visibility situations, or otherwise potentially noteworthy cases, campus landscape professionals may consult with Cal Poly Humboldt Botany or Forestry department faculty for assistance in the development of an action plan to submit to the campus Landscape and Tree Advisory Subcommittee (LTAS) for their approval.

Mechanical Intervention - any physical actions which remove individual pests or alter the environment to make it less suitable for pests. The first and most common level of addressing emerging pest problems is mechanical intervention. Many actions which are broadly recognized as cultural practices, when deployed in a reactive manner to specific instances of pests, fall into the category of mechanical interventions. Pulling or hoeing of weeds; scraping or power washing moss from hardscapes; using a stiff water spray to remove aphids from a plant; individually hand-picking snails from their hiding places; erecting protective fencing to keep deer from tender new plants; discovering and patching rodent entry points into buildings; and trapping moles, gophers, and rats are all examples of mechanical interventions. Mechanical interventions are minimally ecologically disruptive aspects of the everyday groundskeeping routine and though they are reactive to specific pests they do not generally require the more complex factors analysis of biological and chemical interventions.

Biological Intervention - targeted intentional release of predators or other biological agents. Biological systems awareness and leveraging are key at every stage of the IPM process. Biological functions are nearly inseparable from all of the underlying preventative procedures and choices which are broadly termed "Cultural Practices"

(above). However, there is a more precise way in which biological interactions come into play in the reactive stage of the IPM methodology. Some pests may be controlled or eliminated by biological intervention. When a pest problem has reached the action threshold and an intervention is required, if a biological intervention is available, likely to be effective, and economically plausible, it is always preferable to a synthetic chemical intervention. A prime example of a biological intervention, often used on campus, is treatment with Bt bacteria (*Bacillus thuringiensis*) or with Spinosad. These are OMRI (Organic Materials Review Institute) certified, naturally occurring bacterial agents, usually delivered by spray, that are lethal when ingested by insect pests but which have no effect on other organisms and leave no residual presence in the environment. Targeted release of predators such as nematodes or ladybugs are additional examples of biological interventions. Not all pest control issues are amenable to biological interventions but if a biological intervention is available it can be a highly desirable solution.

Pest - any living organism that causes damage or economic loss or transmits or produces disease, according to the California Department of Pesticide Regulation. Pests of concern to the University include not only the common insects, weeds, and rodents that come quickly to mind, but an additional great diversity of biological actors such as mites, algae, fungal pathogens, oomycetes, deer, skunks, and numerous other life forms. IPM principles apply to the control of all pests.

Pesticide - any substance intended to control, destroy, repel, or attract a pest, according to the California Department of Pesticide Regulation. Not all pesticides are created equal, and not all pesticides are synthetic chemicals; many common pesticides are OMRI certified naturally occurring organic substances. In IPM an important principle is to use the **least toxic** pesticide that will accomplish the intended goal. In practice this means that the majority of pesticides used on campus are naturally occurring organic substances such as neem oil, Bt bacteria, horticultural soap, orange oil, and horticultural vinegar. Synthetic chemical pesticides are only used when organic certified options are unlikely to be effective and economically practicable. An additional imperative of IPM is to use the **most narrowly targeted** pesticide that will accomplish the intended goal. This ensures that we minimize unintended impact to beneficial and non-target species. Broad spectrum pesticides are avoided whenever a more precisely formulated substance will do the job.

III. Practices

Workflow and Decision Tree

Appendix A illustrates the standard flow of IPM practices at the University with special attention to pest management decision making.

Scope

Whenever feasible, pest management is accomplished in-house by designated and trained University employees. In situations beyond the existing capability of University staff and resources the University may contract with a third party vendor to provide pest control services. Third party vendors are thoroughly vetted to assure compliance with generally accepted IPM principles. Contracted vendors are required to review the University IPM plan and agree in the service contract to follow the guidelines therein.

Authorization

All University employees involved in pest management activities are appropriately trained for the level of activity in which they engage. The California Department of Pesticide Regulation (DPR), certifies individuals in pest management according to a rigorous process involving documented training, testing and ongoing continuing education. Certifications are renewed every two years. All employees handling or applying pesticides are DPR Qualified Applicator Certificate (QAC) holders or are operating under the immediate supervision of a QAC holder. In addition, all employees handling or applying pesticides will adhere to the recommended personal protective equipment (PPE) requirements laid out in the labels of each pesticide (see below in label instructions section).

Record Keeping

- A. A running inventory of pesticides and other synthetic chemical landscape treatment materials is kept, updated on a yearly basis. Outdated materials are disposed of according to guidelines provided by University Risk Management.
- B. All applications of pesticides or other synthetic chemical landscape treatments are recorded at the time of application by the applicator on a hardcopy, table-format log and on a campus map located in the pesticide storage shed (see below). Entries from the hardcopy log and the campus map are periodically transferred to a searchable digital format in the custody of the Director of Facilities Operations.
- C. For novel or unexpected pest interventions, more detailed documentation of considerations and determinations is merited. In these situations a narrative report will be generated using the “Novel Pest Report” fillable PDF (Appendix B), saved in the appropriate departmental google folder, and attached to the relevant work order. The narrative report includes information about the date the pest was first noticed, the rate and range of the spread of the pest, any cultural practices or other environmental factors (weather, etc.) that may have favored the pest,

any mechanical/biological/chemical interventions that have previously been attempted, the potential risks and costs of leaving the problem unaddressed, an explanation of the proposed biological or chemical intervention including a rationale for that particular treatment, and a proposal of any cultural practices and/or mechanical interventions that may inhibit the pest in the future.

- D. Most pest problems that reach the biological intervention or chemical intervention action threshold are seasonally recurring problems that are well known to the Grounds department professional staff (ex. broadleaf weeds in lawns, scale or thrips infestations of woody shrubs, weeds in hardscape areas that are not amenable to mechanical intervention). The standard treatment of these pest instances has been worked out over previous years of diagnosis and response within an IPM informed framework. Routine response in these instances need not be accompanied by extensive documentation. Documentation in these situations consists of a log entry in a simple table of key relevant factors and on a campus map (see Appendix C for an example of this simple log page).
- E. All manual logs will be digitized regularly and reviewed annually. An overview of standard preventative and reactive practices will be available on the [Grounds Website](#). A more detailed summary of specific applications is available upon request to the Facilities Management email address (fmservice@humboldt.edu).

Pesticide Handling

- A. **Label Instructions** - In California “the label is the law”. All commercially available pesticides come in approved packaging and include an extensive booklet of instructions referred to as the label. It is the legal responsibility of anyone dealing directly with pesticides to be fully familiar with the label and to follow all label instructions with precise care. Handling or using pesticides in any way contrary to label instructions could result in fines or other legal consequences. Oversight and enforcement of these provisions is the responsibility of the DPR, and is conducted locally through the office of the Humboldt County Agricultural Commissioner. Pesticide labels include information such as “Signal Words” indicating the level of toxicity of the product; a comprehensive list of approved and excluded uses for the product; detailed mixing instructions for various product applications; the exact type of personal protective equipment required (ex. gloves, protective eyewear, bodysuit, protective breathing-apparatus, etc); emergency response instructions in case of a medically significant exposure; particular potential ecological harms to avoid (ex: “toxic to bees” or “do not use near waterways”); the amount of time after application that the treated area is unsafe to re-enter; and much more. University pesticide handlers abide by the label instructions without exception.

- B. **Signage & Information** - Any time ready-to-use pesticides or other synthetic chemical treatments are being transported or applied, the applicator must have a printed copy of the SDS and/or the full label booklet in plain view and easily accessible in their vehicle. This information, which could be helpful in case of an emergency, is typically kept in a waterproof envelope labeled with the name of the pesticide.

Any time ready-to-use pesticides or other synthetic chemical treatments are being transported or applied the applicator must display signage on their person or on the dispensing apparatus indicating the active ingredient being used. This is regularly accomplished by displaying a laminated photocopy of the product label.

Any time pesticides or other synthetic chemical treatments are applied to landscaped areas on campus, signs are posted for the duration of the restricted entry interval. Signs include a simplified and easily understandable description of the treatment (ex. "lawn fertilizer", "grub treatment", "pH adjustment", etc.); the date of application; the date of authorized reentry; and the facilities departmental email, phone, and website for more information.

It is the responsibility of the Director of Facilities Operations or their designee to assure that these booklets, labels, and signs are available for all substances currently in use. The Director of Facilities Operations creates and maintains an active list of pesticides and synthetic chemical landscape treatments used on campus, and the list is updated in real time and reviewed annually. All new pesticides or synthetic chemical landscape treatments are integrated into the notification and record keeping system when brought into use.

- C. **Timing of Application** — In accordance with label instructions, pesticides and other synthetic chemical treatments may only be applied during periods of favorable weather. Appropriate weather conditions vary according to the substance, the formulation, and the method of application but will often include specifications of temperature, wind, cloud cover, and anticipated precipitation. Additionally, every effort is made by applicators to time application to coincide with minimal human and pet activity so as to avoid undue public concern; treatments are often but not always applied in the early morning or on weekends.
- D. **Pesticide Storage** — All pesticides and other synthetic chemical landscape treatments are stored in controlled-access, ventilated settings with appropriate signage as required by DPR and other relevant agencies. As noted earlier, a

running inventory of pesticides and other synthetic chemical landscape treatment materials is kept in the storage area, updated on a yearly basis. Outdated materials are disposed of according to guidelines provided by University Risk Management.

IV. Contacts and Accountability

At the direction of the Humboldt County Agricultural Commissioner or any other public agent with relevant authority, these practices may be amended at any time. All campus and public comments are welcome through the Facilities Management departmental email.

This document will be comprehensively reviewed every two years by a working group composed of members of the Grounds Department and the Sustainability Department, under the oversight of the Director of Facilities Operations. In the interim it may be amended as needed by the Director of Facilities Operations with the approval of the Facilities Management Leadership Team. Updates to this document will be communicated promptly to the University Landscape and Tree Advisory Committee which reports to the University Space & Facilities Advisory Committee, which reports directly to the University Senate.

Any questions, concerns, or requests for further information about Cal Poly Humboldt's IPM Plan and practices may be directed to:

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V. Resources

University of California Statewide IPM Program
<https://ipm.ucanr.edu>

USDA National IPM Database
<https://ipmdata.ipmcenters.org/>

Humboldt County Agricultural Commissioner
<https://humboldt.gov.org/623/Agricultural-Commissioner>

California Department of Pesticide Regulation

<https://www.cdpr.ca.gov/>

Organic Materials Review Institute

<https://www.omri.org/>

Landscape & Tree Advisory Committee

<https://www.humboldt.edu/senate/landscape-and-tree-advisory-committee>

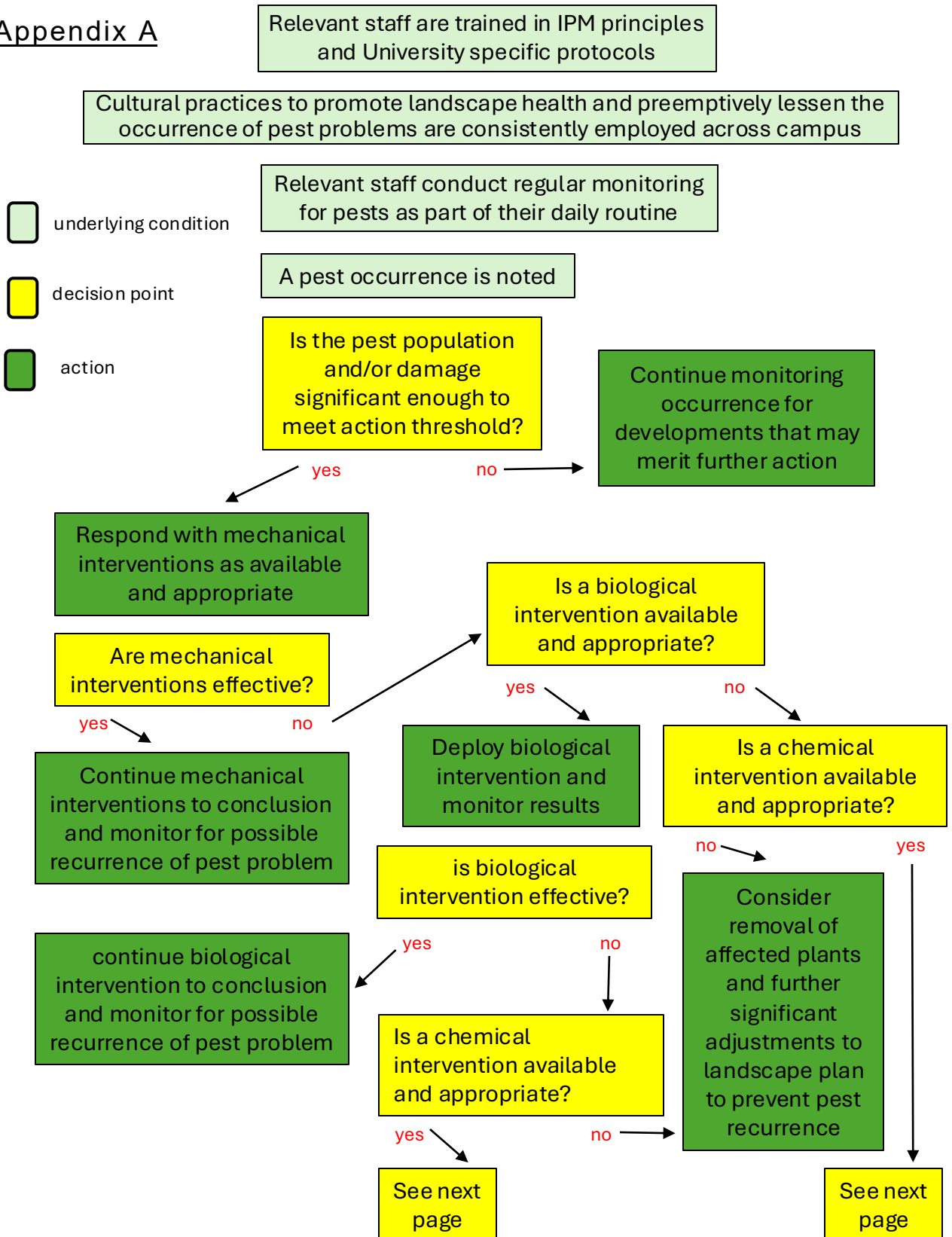
Appendix A - Workflow

Appendix B - Novel Pest Report

Appendix C - Pesticide Log Page

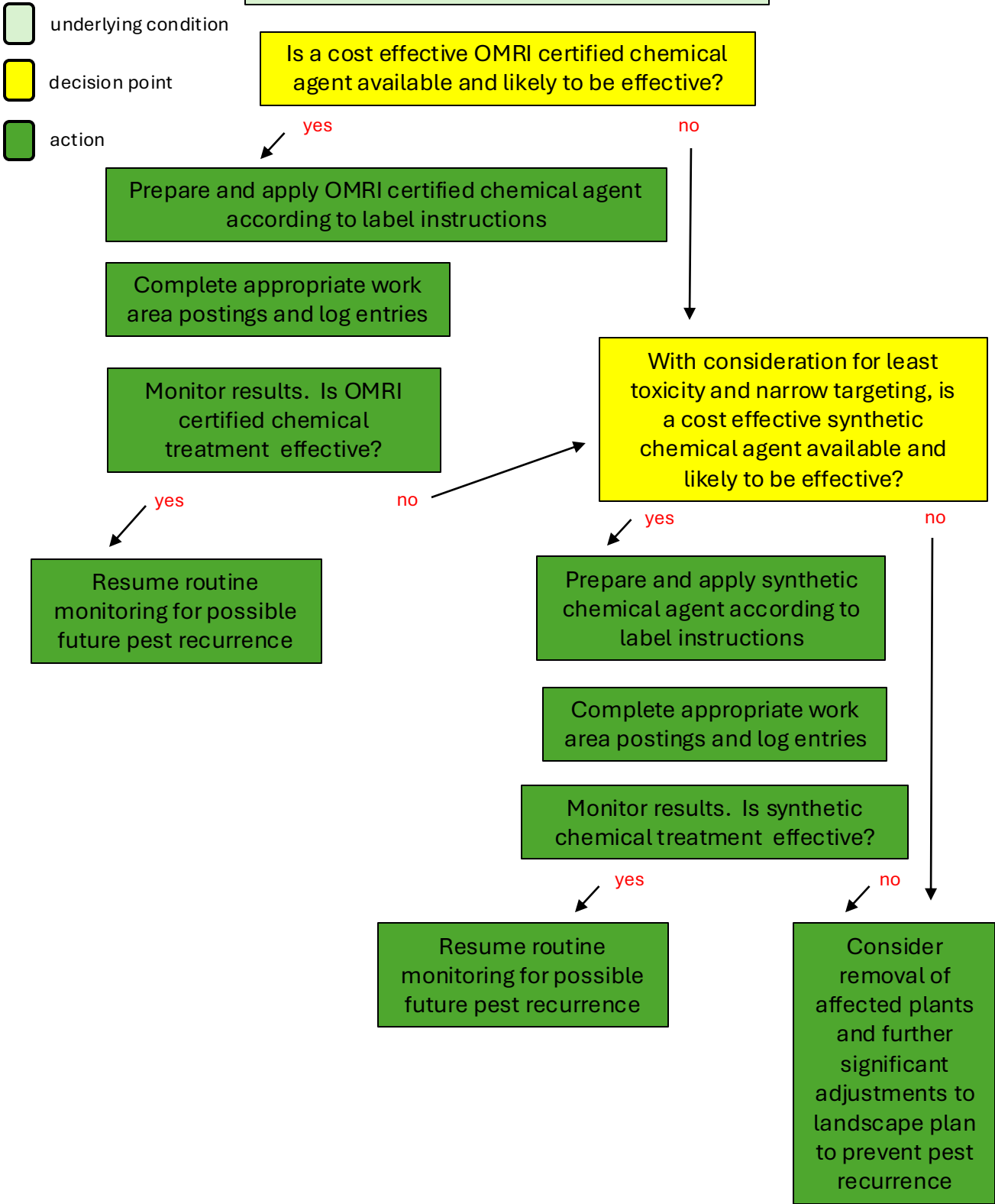
University Standard IPM Practices Workflow & Decision Tree

Appendix A



(see next page for chemical interventions)

University Standard IPM Practices Workflow & Decision Tree Continued



Appendix B

NOVEL PEST REPORT

Date the pest was first noticed:

Rate and range of the spread of the pest:

Cultural practices or other environmental factors (weather, etc.) that may have favored the pest:

Mechanical/biological/chemical interventions that have previously been attempted:

Potential risks and costs of leaving the problem unaddressed:

Explanation of the immediate proposed biological or chemical intervention including a rationale for that particular treatment:

Proposal of any future cultural practices and/or mechanical interventions that may inhibit the pest:

