



RESOURCES: BEST PRACTICES AND ALTERNATIVE APPROACHES TO PEST MANAGEMENT

PUBLIC HEALTH PEST MANAGEMENT

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BACKGROUND

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A wide variety of species fall within the public-health domain as pests because they have an adverse impact on the health and well being of U.S. residents. This list includes many species of arthropods, vertebrate animals, venomous reptiles and other animals, poisonous plants, and fungi. Some public-health pest threats have similar origins throughout the country, whereas others are unique and require different management approaches.

Arthropods

Arthropods are historically known as major causes of disease. For example cockroaches, flies, mosquitoes, ticks, and fleas are directly involved in the transmission of such diseases as food poisoning, malaria, typhus, viral encephalitis, plague, and Lyme disease. Some arthropod pests bite, sting or cause allergic reactions and others do not envenomate or transmit disease, but are merely annoying.

Arthropods of public health importance are divided into four groups:

1. Species that inject their venom by means of fangs or stingers. For example: Spiders, Scorpions, Centipedes, Ants, Wasps and Bees etc.
2. Species that inject their venom along with their saliva. For example: Mosquitoes, Midges & Gnats, Lice, Bed Bugs & allies, Conenose bugs & allies, Fleas, Ticks and Mites etc.
3. Species that are sources of allergenic emanations and inhalant allergies. For example: Mayflies, Moths & Butterflies densely covered with scales & hairs, Aphids, Caterpillars with urticating hairs, Blister beetles, Millipedes and House dust mites etc.
4. Species that do not envenomate but are merely pestiferous. For example: Certain midges become so annoying that they may cause recreational areas to be abandoned. Eye gnats are another example. Also, there are larvae of certain insects that invade body tissues or cavities of humans, causing a condition known as myiasis.

Many vertebrate animals expose humans to dangerous pathogens of public-health significance. Some of these vertebrate pests expose humans to disease organisms without benefit of an arthropod vector, or are primary reservoirs of organisms that cause important human disease. Examples of this type of pest are domestic (house mouse, rat) and wild or sylvan rodents. These rodents can infect humans directly with diseases such as tularemia, leptospirosis, arenavirus, Hantavirus, ratbite fever, lymphocytic choriomeningitis and salmonellosis (food poisoning). They also may serve as reservoirs for diseases transmitted by ectoparasites, such as tick-borne relapsing fever, Colorado tick fever, Rocky Mountain spotted fever, plague, murine typhus, rickettsial pox, Lyme disease, ehrlichiosis, babesiosis and tularemia. Birds, bats and small mammals can be carriers of rabies, histoplasmosis, listeriosis or leptospirosis.

Venomous reptiles (snakes)

Venomous reptiles (snakes) are another group that is of public health importance. There are some dangerously venomous snakes throughout the United States. In North America north of Mexico, pit vipers, which include the cottonmouth moccasin, copperhead, about 20 species of rattlesnakes and 2 species of coral snakes, are the principal venomous snakes.

Poisonous plants

Poisonous Plants may poison livestock, pets, and humans. [Thirty types of plants](#) account for the majority of plant calls to California Poison Centers. [Bay Area Hiker](#) has put together a handy resource of photographs of poisonous plants that might be encountered on hikes in the San Francisco Bay Area. [Find out more like](#) How do I prevent poisoning from plants? Which plants are most commonly involved in calls to the Poison Center in California? What are oxalate-crystals and how dangerous are the plants that contain them? What if I don't know the name of the plant? What plants are dangerous? Can pets get poisoned from plants? What to do for a plant poisoning?

Agency and Department Roles in Public Health Pest Management

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As described above, public health pest management is a large area of expertise covering a broad subject matter. Such broadness makes it impractical and particularly unwieldy for pest management to be handled by a single agency.

An example: Santa Clara County's Pest Management Program

The Santa Clara County IPM Program provides overall administration and support, in consultation with appropriate agencies or departments, for public health pest control issues in County owned or leased facilities. The Department of Agriculture is responsible for providing guidance and enforcement on pesticide use regulations and various pest outbreaks important to sustainable agriculture. Noxious weed management in the regional parks, rangelands and other open areas is primarily the function of the Natural Resource Management Division of the Department of Parks & Recreation. The Department of Roads & Airports manages total vegetation control on rights-of-way. Additionally, individual departments or user groups like Health & Hospital systems, Social Services Agency, and General Services Agency organize turf and landscape services, structural pest control through in-house staff or contracted services.

The Department of Environmental Health [Vector Control District](#) is the primary agency responsible for countywide public health pest control services (arthropods and vertebrate pest control only). The district provides services related to the detection and minimization of vector-borne diseases, mosquito abatement, and assists the public in resolving problems with rodents, wildlife, and insects of medical significance.

The [Santa Clara County Weed Management Area](#) (SCCWMA), a partnership of public and private land and watershed managers, also provides weed abatement and control. It is successfully halting the spread of noxious weeds and to restoring infested lands to a healthy and productive condition through the implementation of an integrated weed management program.

Whether the responsibility of city or county health organizations or public works programs, or independent taxing districts, mosquitoes and vector-control programs exist primarily to protect the public from organisms that cause discomfort or transmit disease agents. Federal, state and municipal regulations provide the essential guidelines for achieving these objectives, but how the task is done varies from place to place.

Comprehensive control programs are carefully planned and executed operations aimed at ensuring effective and continuous control of mosquitoes or other vectors in a given area. They follow an integrated approach using combinations of methods designed to give maximum control with minimal impact on non-target organisms, the environment and the

general public. Such programs must consider cost/benefit ratio estimates and be economically realistic.

Established programs are routinely in a state of readiness in order to manage the normal course of events and to respond to the unexpected. Throughout the U.S. there is continual threat of introduction of exotic public-health pests and disease organisms. Detection of introduced pests is usually difficult and delayed, thus reducing the likelihood of eradication and leading to a policy of containment to prevent or slow further spread.

Under normal situations, control of public-health pests is a three-step process: data collection, data analysis and appropriate action. Data collections are performed routinely, and it is important that, before any control procedures are initiated, an assessment be made of the overall problem. The objective of the collection and analysis of surveillance data is to provide information regarding the identity, density and stage of development of the problem pests, as well as identification of the specific problem areas. This information provides the basis for prioritizing needs and developing strategies to initiate plans of action for control.

The following guides and related links provide useful information on the identification, biology, significance and control of pests impacting public health:

Arthropod Pests of Public Health Importance

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Biting Arthropod Pests

- Conenose Bugs: [Assassin and Kissing Bugs](#)
- [Bed Bugs](#) (UC Statewide IPM)
- Fleas
 - [Cat Flea](#) (UC Statewide IPM)
 - [Human Flea](#) (The Piedpiper.co.uk)
- [Head Lice](#) (UC Statewide IPM)
- Mites
 - [Chigger Mites](#) (Arizona Agriculture)
 - [Mites that "Bug" people](#)
 - [Bird Mites](#) (Dermanyssid and Macronyssid Mites)
- [Mosquitoes](#) (UC Statewide IPM)
- [Mosquitoes](#) (Oklahoma State Univ.)
- [Spiders](#) (UC Statewide IPM)
 - [Widow Spiders](#) (UC Statewide IPM)
 - [Black Widow Spiders](#) (Huge Collection from Arachnology)
 - [Black Widow Spider](#) (Ohio State Univ. Cooperative Extension)
 - [Black Widow Spiders](#) (Virginia Cooperative Extension)
 - [Brown Recluse \(Violin\) Spiders](#) (Huge Collection from Arachnology)
 - [Brown Recluse and other Recluse Spiders](#)
 - [Recluse Spiders](#) (Hobo Spider Web Site)

- [Hobo Spider](#)
- [Hobo Spiders](#) (Aggressive House Spider (Collection from Arachnology))
- [The Widow Spiders](#) (Hobo Spider Web Site)
- [Yellow Sac Spiders](#) (Hobo Spider Web Site)
- [Spider Bites](#) (WebMD)
- [Ticks](#)

Stinging Arthropod Pests

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- [Facts on Stinging Insects](#) (MCG)
- [Stinging Insects](#) (Santa Barbara Coastal Vector Control District)
- [Stinging Insects in the Garden](#) (NASD)
- [Venomous or Stinging Insects and Related Pests](#) (FAIRS)
- Bees, Wasps and Hornets
 - [Africanized Honey Bee](#) (UCSD)
 - [Asthma and Bee Allergy](#) (Allergy Society of South Africa)
 - [Yellowjackets](#) (OUPD)
 - [Yellowjackets, Paper Wasps and Mud Daubers](#) (UC Statewide IPM)
 - [Mud-daubers](#) (OUPD)
 - [Bees, Wasp and Fire Ant Stings](#): This UC publication is about stings from bees and wasps, but the information also pertains to stings from fire ants as well.
 - [Bee and Wasp Stings](#) (Ohio State Univ. Cooperative Extension)
 - [Bee and Wasp Stings](#) (WVU Extension Services)
 - [Bee and Wasp Stings](#) (WebMD)
 - [Bees, Africanized Honeybees and Wasps](#) (UCSD)
- [Ants](#) (UC Statewide IPM)
- [Red Imported Fire Ant](#) (UC Statewide IPM)
- [Fire Ants](#) (Oklahoma State Univ.)
- [Fire Ants](#) (UMN)
- [Stinging Caterpillars](#) (Univ. Kentucky)

Other Arthropod Pests of Public Health Importance

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- [Filth Breeding Flies](#): House flies, Stable flies, Flesh flies, Blowflies and Bottle flies, Filter flies & Moth flies, Solider flies, Vinegar (Fruit) flies, Eye Gnats, Humpback (Phorid) flies, Dump flies, Secondary Screwworm flies
- [Cockroaches](#): German cockroach, Brown Banded cockroach, American cockroach, Oriental cockroach, Smokeybrown cockroach.
- Stinging Caterpillars: [Caterpillars with urticating hairs](#)

Non-Arthropod Pests of Public Health Importance

[The Internet Center for Wildlife Management](#): Click here to find a suspect problem animal or to find solutions. From armadillos to salamanders, from bats to deer, this site has it all! (University of Nebraska, Lincoln)

Vertebrate Pests

- [Rats](#) (UC Statewide IPM)
- [House Mouse](#) (UC Statewide IPM)
- [Raccoons](#) (UC Statewide IPM)
- [Skunks](#) (UC Statewide IPM)
- [California Ground Squirrels](#) (UC Statewide IPM)
- [Pest Birds](#) (Birdbarrier.com)

Venomous Reptiles & other animals

- Snakes – [Facts about snakes in California](#)
- [Venomous Snake links](#) (Bangor.ac.uk)
- [Dr. Seward's Gila monster Page](#)
- [For Goodness Snakes: Treating and Preventing Venomous Bites](#) (FDA)
- [Guide to Florida's Poisonous Snakes](#) (Florida's Museum of Natural History)
- [Rattlesnakes](#) (Desert USA)
- [Snakebite Emergency First Aid Information](#) (New York Search & Rescue)
- [Snakebites](#) (GORP)
- [Venomous Animals of Southern California](#) (UCSD)
- [Scorpions](#) (UC Statewide IPM)
- [Scorpions](#) (Desert USA)
- [Compendium of Dangerous, Deadly and Venomous Creatures](#) (World Wide Walkabout)

Poisonous Plants

- [Poisonous Plants Informational Database](#) – Cornell University
- [Poisonous Plants of California](#): This highly informative volume describes California's native, naturalized, and cultivated plant species which can be poisonous and describes how to recognize them, where they are found, and what symptoms they produce.
- [FDA Poisonous Plant Database](#)
- [Outsmarting Poison Ivy and Its Cousins](#) (FDA)
- [Poison Ivy](#) (Health Gazette)
- [Poison Ivy, Western Poison Oak, Poison Sumac](#) (Ag and Agri-Food Canada)
- [Poison Oak](#) (UC Statewide IPM)

- [Poison Oak FAQ](#)
- [Poisonous Plants Around the Home](#) (NASD)
- [Toxic Plant List](#) (Child & Family, Canada)
- [Canadian Poisonous Plant Information System](#)
- [Poison Ivy, Oak, and Sumac Information Center](#)
- [Poisonous Plants Bibliography](#) - California Academy of Sciences Library

General Guides

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- [Public Health Pest Control](#): The National USA Manual and Related Information- This site offers identification assistance and management information on arthropod and mammalian vectors of diseases affecting the public health.
- [Pest Management Information for Public Health Professionals](#): Vector Borne diseases, Other pest related conditions, Public Health Pest Solver, Diagnostic Pesticide Toxicity, Pesticide Toxicity Databases, Children Health & Pesticides, Human Health Risks of Pesticides – Pennsylvania IPM Program
- [Handling Yellow Jackets Emergencies in Open Spaces such as Parks, Urban Landscapes](#) – SCC IPM Program Brochure
- [Digital Diagnostics-Information on Insect and Plant Diseases](#) (Oklahoma State Univ.)
- [Centers for Disease Control & Prevention](#) (CDC), US Department of Health & Human Services:
 - [Health Topics A to Z](#): CDC Site provides information on all health topics including pest related diseases. A few of important disease and infections related to pests are as follows:
 - [Arboviral Encephalitides](#) (CDC)
 - [Avian Influenza Outbreak](#) (CDC)
 - [Avian Influenza--Latest Information](#) (WHO)
 - [Dengue Fever & Dengue Hemorrhagic Fever](#) (CDC)
 - [Domestic Arboviral Encephalitides](#) (CDC)
 - [Hanta Virus Pulmonary Syndrome](#) (CDC)
 - [Japanese Encephalitis](#) (CDC)
 - [Lyme Disease](#) (Borrelia burgdorferi Infection) (CDC)
 - [Malaria](#) (CDC)
 - [Plague](#) (CDC)
 - [Parasitic Pathways – Insect & Worms](#): Provides information on several parasitic diseases related to insect & worms for example: [Chagas disease](#) (American trypanosomiasis) (CDC)
 - [West Nile Disease](#), Fight the Bite! (CDC)

- [Yellow Fever](#) (CDC)
- [EPA and Mosquito Control](#): These documents provide some basic information on mosquito control, safety precautions, and information on insecticides used for mosquito control programs.
- [Mosquito Management Guidelines](#): (UC Davis Statewide IPM Program) the mosquitoes of major concern in California belong to the genera Culex, Aedes, and Anopheles. Control of mosquitoes may prevent several mosquito-borne diseases.
- Additional Information on West Nile Virus, Mosquito Prevention & Control:
 - [DEET](#) (EPA Pesticide Fact Sheet)
 - [Using Insect Repellents Safely](#) (EPA)
 - [Mosquitoes and West Nile Virus](#) (Oklahoma State Univ.)
 - [New York State West Nile Virus Response Plan](#) (NY State Dept. of Health)
 - [Q & A's for Pet Owners](#) (Oklahoma State Univ.)
 - [The Buzz-z-z-z on West Nile Virus](#) (BAM! CDC's Kids' Page)
- [Lyme Disease](#): Centers for Disease Control & Prevention: Lyme disease is an infection caused by *Borrelia burgdorferi*, a member of the family of spirochetes, or corkscrew-shaped bacteria. Lyme disease is spread by the bite of ticks of the genus Ixodes that are infected with *Borrelia burgdorferi*. On the Pacific Coast, the bacteria are transmitted to humans by the western-blacklegged tick. Other Info-links to Lyme disease are as follows:
 - [Lyme Disease](#) (NASD)
 - [Lyme Disease FAQ](#) (Lloyd E. Miller)
 - [Tick Borne Diseases](#) (CDC)
 - [Tick Tactics](#) (BAM! CDC's Kids' Page)
 - [California Lyme disease Association](#)
- [Head Lice](#): Harvard School of Public Health: Infestations by head lice become most apparent at the beginning of each school year. Parents, day care providers, school officials and healthcare professionals frequently seek information and solutions to this burdensome problem.
- [Delusory Parasitosis](#): This UC publication is about the sensation feels like bugs, worms, or mites that are biting, crawling over or burrowing into, under, or out of your skin. They must be there, because you can feel them and you are even pretty sure that you can see them. You may also believe that your home or furniture is infested, but you may be the only one who knows they are there. No one seems to think they exist except you. Nothing seems to get rid of them. So what are they?
- [Entomophobia, Delusory Parasitosis and Illusions of Parasitosis](#): Historically, there has been considerable confusion and definitional overlap between insect phobias, delusions of Parasitosis and illusions of Parasitosis. Clinically, it is important to differentiate these conditions both from each other and from conditions with similar

symptoms: the different psychologies involved should help direct appropriate treatment. This article titled "Insects in Psychiatry" was produced by Dr Phillip Weinstein of the University of Otago, Australia and originally appeared in the Digest of Cultural Entomology.

- [Mystery Bugs](#) (Ohio State University Extension)

POISON HELP 1-800-222-1222

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- [U.S. Poison Control Centers](#): If you have a poisoning emergency, you can reach the closest center by calling [1-800-222-1222](#). **If the victim has collapsed or is not breathing, call 911.**
 - [First Aid Tips for Poisoning](#): American Association for Poison Control Centers
-