



PRESIDIO TRUST
ROADS & GROUNDS
IPM PROGRAM

FEBRUARY 2005

SIGNATURE PAGE

The following individuals are responsible for overseeing the implementation of this IPM Program. This document is a result of a consensus among these individuals, and we agree to adhere to the IPM Program as presented herein.

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INTRODUCTION

Integrated Pest Management (IPM)

IPM is an ecosystem-based strategy that focuses on long-term prevention of pests and their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant plant varieties. Pesticides are used only after monitoring indicates they are needed, according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment.

Purpose and Scope of Presidio Trust Roads & Grounds IPM Program

This plan is intended to provide clarity about appropriate pest management methods, and permitted materials for managing the landscape and structural pests that are likely to occur in the cultural landscape and buildings under Presidio Trust jurisdiction.

This program is designed to help preserve and protect the natural resources of the Presidio including wildlife and groundwater, and to protect the health and safety of Presidio tenants and visitors. The Presidio is home to many protected bird, mammal, invertebrate, and plant species. At least four endangered native plant species, including San Francisco lessingia (*Lessingia germanorum* var. *germanorum*), Raven's manzanita (*Arctostaphylos hookerii* spp. *Ravenii*), and Presidio clarkia (*Clarkia franciscanum*) occur in the Presidio, along with nine additional special status plant species, designated by the California Native Plant Society as "rare, threatened, or endangered in California or elsewhere." The Presidio is the only San Francisco location home to the western screech owl (*Otus kennicottii*), and the wrentit (*Chamaea fasciata*). It is one of only two San Francisco locations for the California quail (*Callipepla californica*).

The need for integrated pest management in the park is identified in the Presidio Trust Management Plan, the guiding management plan for Area B of the Presidio. Pesticide drift, runoff, and groundwater contamination are of significant concern with prevention of groundwater and storm water runoff contamination a high priority. Lobos Creek, the Presidio's primary water source is groundwater fed and our storm drains run directly to the bay. For these reasons, non-chemical pest control is preferred over the use of pesticides. Only in instances where non-chemical methods have proven insufficient or not feasible shall pesticides be used, and then only pesticides that have been determined to be of low-risk to people and natural resources shall be used.

It is important to note that IPM is an evolving science; this plan is a dynamic document that will be updated and improved as changes occur and new technologies and practices become available. This IPM Program shall be reviewed annually by Presidio Trust staff to determine whether it should be amended to accommodate the use of new IPM techniques, to permit the use of new low-risk pesticides, or to prohibit the use of currently used pesticides.

Approved Pesticides

A pesticide is any chemical used to control a pest. Pesticides include, but are not limited to, herbicides, insecticides, fungicides, and rodenticides. Among the vast number of pesticides available, there is a significant range of toxicities and risks associated with their use. In IPM, pesticides are used only when non-chemical pest control has proven ineffective or unfeasible. And in such cases, the least-toxic effective pesticide is used.

This IPM Program contains a Pre-Approved Pesticide List (see Appendix A), for control of the pests common to the park. The pesticides on this list present the lowest risk to park tenants, visitors, and wildlife. Pesticides that were excluded from the pre-approved list include the following:

- Pesticides categorized by California Department of Pesticide Regulation as Restricted Use pesticides.
- Pesticides with ingredients listed on the CA Proposition 65 list of known human carcinogens and reproductive toxins.
- Pesticides with ingredients that are known developmental toxins.
- Pesticides with ingredients that are cholinesterase inhibitors.
- Pesticides that are categorized by California Department of Pesticide Regulation as known groundwater contaminants.
- Pesticides with a high acute toxicity to humans, birds, fish, or non-target insects.

As new pesticide products become available, or as landscape managers request the use of a previously unlisted low-toxicity pesticide, the Presidio Trust IPM Coordinator will update the Pre-Approved Pesticide List as needed.

Pesticide Evaluation & Use

Pesticides must be used properly and in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions will always be worn when applying pesticides and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

When pesticides are applied in an outdoor setting, the applicator may choose to post a notice of intent to apply pesticide up to 72 hours prior to the application. If posting is done, notices shall contain the following information. (See Appendix C for a template notice of intent to apply a pesticide.)

- Statement indicating that the pesticide has been evaluated and determined to pose no significant risk to people and wildlife.
- Trade name and EPA number of pesticide to be used.
- Signal word from the label of the pesticide to be used (Caution, Warning, or Danger).
- Date and approximate time of the upcoming application.
- Description of areas that will be treated.

- Contact phone number for information.

Each pesticide applicator is required to carry a universal vehicle spill kit, which contains absorbent socks, absorbent pillows, cable ties, hazardous material bags, light stick, and repair putty. In the event of an incident, it is the responsibility of the applicator to perform the following responsibilities:

- Evacuate personnel from the immediate area
- Identify the spilled chemical
- Notify the Presidio Trust Hazardous Materials and Waste Coordinator
- Wear appropriate respiratory protection, protective clothing, chemical splash shield, goggles, and gloves.
- Barricade the spill area and notify others in surrounding areas
- Extinguish all sources of ignition and contact the fire department if the chemical is flammable.
- Ventilate the spill area
- Contact Supervisor
- Place spill pillows and/or spill socks in desired position to absorb, divert, or contain the spill as needed.
- Once the spill is diked to control its spread, additional absorbent materials or neutralizers can be used to finish the clean-up.
- Document spill clean-up activities, identify cause, and determine remedial action.
- Mark Hazard Material bag with contents.
- Coordinate with the Hazardous Materials and Waste Coordinator for proper disposal of waste.

Use of Pesticides Not on Pre-Approved Pesticide List

Use of any pesticides not on the current Pre-Approved Pesticide List is prohibited without prior approval after review by an ad hoc committee consisting of the IPM Coordinator, the Presidio Trust NEPA Compliance Manager, and a representative from the Presidio Trust Real Estate department (see Appendix B). Approval shall be considered only in instances where pesticides on the Pre-Approved Pesticide List have proven ineffective in addressing the problem, and where there is no potential for significant environmental impact. Approval shall be conditioned upon any measures required to minimize risks.

Landscape and Structural Pest Control Contracts

Any landscape or structural pest control contract for Presidio landscapes or buildings must contain an IPM policy statement and IPM performance specifications to ensure compliance with this IPM Program. Contractors wishing to use any pesticides on the Pre-Approved Pesticide List must submit notification to the Presidio Trust IPM Coordinator at least twenty-four hours prior to the application. Contractors wishing to use any pesticides not on the Pre-Approved Pesticide List must request prior approval from the Presidio Trust IPM Coordinator. Contractors may use the Presidio Pesticide Use Request form (available from the Presidio Trust IPM Coordinator) to do so. Requests will be granted where there is a

HOW TO USE THIS IPM PROGRAM

This document lists the IPM options for the major pests likely to be managed in Presidio cultural landscapes and buildings. An individual section has been prepared for each pest, and contains the following:

General information

Pertinent information including very general pest biology and Presidio-specific background.

Monitoring

Methods for monitoring each pest. The purpose of monitoring is to supply recent, accurate information that can be used to make informed pest management decisions. Monitoring helps with the early detection of pests, which often allows for the implementation of non-chemical control tactics before serious damage occurs.

Action threshold

The action threshold is the level of pest infestation at which treatment is justified to keep an increasing pest population from causing unacceptable damage to people or property. Action thresholds are based on research and field experience.

Education

In some cases, education of building occupants may be key in pest management.

Primary control: non-chemical

A list of the non-chemical options for each pest. This is the primary, and in some cases the only method of pest control approved for use in the Presidio.

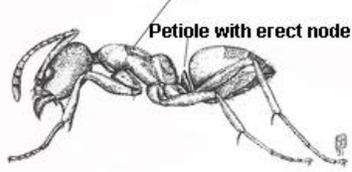
Secondary control: pesticides

For some pests, materials on the current Pre-Approved Pesticide List (see Appendix A) may be used if non-chemical methods prove insufficient.

It is important to note that this document gives only general information and lists the various control options for each pest. For detailed information on pest biology and habits, monitoring techniques, and successful approaches to implementing control methods, refer to the *Integrated Pest Management Information Manual for the Presidio*. This can be obtained through the Presidio Trust IPM Coordinator, and represents a resource for the implementation of this IPM Program.

ANT MANAGEMENT

Thorax uneven in shape



Argentine Ant, with identifying characteristics noted.

Illustration courtesy of UC Statewide IPM Project

Ants become a pest when they invade buildings searching for food or when they protect plant-feeding insects such as aphids and scale from attack by their natural enemies. It is neither desirable nor practicable to try to eliminate ants from their outside habitat, so management efforts shall aim to keep them from infesting structures, and to prevent them from tending plant-feeding insects.

The most problematic ant species in the Presidio is the imported Argentine ant, *Linepithema humile*. This ant is a very successful competitor and has virtually eliminated native ant species in developed locations in the Bay Area.

The following management methods shall be used for ants. Non-chemical controls shall be used in conjunction with the use of pesticides.

MONITORING

Identify the problem ant species. Monitor the area to determine ant entry points, food sources, or indoor habitats they are seeking for temporary shelter. Record entry points, chronic food sources, etc. and use this information to direct habitat modification and suppression efforts.

Once the immediate ant problem is solved, continue periodic monitoring of locations with a recurring history of ant problems in order to spot incipient problems. Time these visits just prior to periods of seasonal ant activity.

ACTION THRESHOLD

Control tactics shall be initiated indoors when building occupants request control. Control tactics shall be initiated in the landscape when ants are interfering with the natural enemy control of ornamental plant pests.

EDUCATION

Remind building occupants that proper food storage and sanitation plays an important role in solving a current ant problem and preventing future infestations.

PRIMARY ANT CONTROL: NON-CHEMICAL

Physical controls: Indoors

- Caulking obvious ant access points with silicone caulking compound
- Vacuuming

- Sanitation
- Trash management
- Proper storage of food

Physical controls: Landscape

- Sticky barriers and Teflon® barriers
- Detergent barriers
- Flooding

SECONDARY ANT CONTROL: PESTICIDES

For ants, fipronil bait, orange oil spray, diatomaceous earth dust, boric acid dust, sodium tetraborate, and hexa-hydroxyl are included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides, and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

BED BUG MANAGEMENT



Adult bed bug feeding on a human (left) and bed bugs in mattress seam (right).

Photographs courtesy of Virginia University of Kentucky

Bed bugs are wingless insects that feed on the blood of birds, rodents, bats, and humans. Adult bed bugs are oval, about 1/5 inch long, and rusty red or mahogany in color. The young stages of this insect look similar to the adult, but are smaller in size, and have a yellowish white color. The most common species feeding on humans in California is *Cimex lectularius*. Although bed bugs can harbor pathogens in their bodies, disease transmission to humans is considered highly unlikely by the University of California. For this reason, these authorities do not consider them a serious disease threat. Their medical significance is mainly limited to the itching and inflammation from their bites.

Female bed bugs lay eggs on rough surfaces, such as wood or paper, which hatch in about 10 days. After hatching, the egg shells frequently remain in place. There are five progressively larger nymphal stages, each requiring a single blood meal before molting to the next stage. The entire life cycle from egg to adult requires anywhere from 5 weeks to 4 months, depending on temperature. When temperatures are in the range of 70° to 82°F, development occurs most rapidly. Bed bugs generally feed at night and hide in crevices during the day. Common hiding places include seams in mattresses and box springs, cracks in bed frames, under loose wallpaper, behind picture frames, and inside furniture and upholstery.

Bed bugs can go without feeding for 80 to 140 days; older stages can survive longer without feeding than younger ones. Adults live about 10 months and there can be up to 3 to 4 generations per year. Bed bugs do not have nests, but do tend to congregate in habitual hiding places. A likely sign of bed bugs is rusty or reddish spots of blood on bed sheets or mattresses.

MONITORING

Identify the presence of bed bugs or their droppings by inspecting mattresses, bed frames, headboards, furniture (particularly upholstered furniture) and wall cracks and crevices. Monitor the entire unit to determine infestation sites.

Since this insect can occur where there are birds or mammals nesting on or near a house, inspect the outside areas near an infestation to determine if animals are nesting nearby.

Dry ice (carbon dioxide) baited traps or sticky cards can be used to monitor for bed bugs.

ACTION THRESHOLD

Control tactics shall be initiated when building occupants request control and bed bug presence is confirmed. If presence is confirmed in one unit, adjacent units should be inspected, and control actions taken if bed bugs are detected.

EDUCATION

Educate building occupants of ways they can assist in controlling an infestation by disposing of clutter around beds or other harborage areas. Inform tenants that movement of infested clothing, bedding, furniture, rugs, or other household items will facilitate the spread of this pest. For this reason, tenants should be sure they are not moving infested items into uninfested areas. For instance, after using a vacuum cleaner in an infested area, it is important to discard the vacuum cleaner bag in a sealed plastic bag and install a new clean bag before the vacuum is used again in another area.

Explain to building occupants that to achieve complete control, pest control technicians will need access to all places where bed bugs can hide, thus personal items such as furniture and clothing might need to be moved or inspected. Further, tenants may be required to dispose of infested items if bed bugs cannot be successfully removed.

If bed bugs are present in a multiple unit building, it is important to educate and involve building managers in ensuring that all tenants are educated about what might be required of them for successful control of these pests.

PRIMARY BED BUG CONTROL: NON-CHEMICAL

Physical controls: Indoors

- Remove bird or mammal harborage in or near the infested building. Removal of bird nests during bird nesting season will require prior approval through Presidio Trust Natural Resources.
- Steam clean or bag and discard bedding, fabric, upholstery, carpets, rugs, furniture or any other known or suspected area of harborage. If a steam cleaner is used, it must bring the temperature of the item to at least 120° F for 30 minutes in order to kill bed bugs and their eggs.
- Small infested items may be bagged and placed in a freezer at a temperature below of 49° F for at least two weeks, or placed in a container with dry ice for four hours.
- Infested areas can be cleaned with soap and water or isopropyl alcohol to remove bed bug debris.

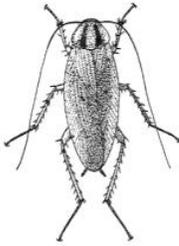
SECONDARY BED BUG CONTROL: PESTICIDES

For bed bugs, orange oil spray, diatomaceous earth dust, deltamethrin, and S-hydroprone are included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained through the Presidio Trust IPM Coordinator before using any pesticides not included on the Pre-Approved Pesticide List.

As always, pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff,

and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides, and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

COCKROACH MANAGEMENT



German Cockroach adult.

Illustration courtesy of Virginia Cooperative Extension

Cockroaches consume human foods and contaminate them with saliva and excrement, produce secretions that impart a fetid odor, and shed skin scales that engender allergic reactions. Most roaches are nocturnal and prefer darkness. If they are seen in a building during the day it is generally an indication of a large infestation.

Four cockroach species are found at the Presidio: the German cockroach (*Blattella germanica*), brownbanded roach (*Supella longipala*), oriental cockroach (*Blatta orientalis*), and American roach (*Periplaneta americana*). Of these, the German cockroach is the most troublesome, and is the primary focus of this plan. However, the basic principles for managing roaches indoors are the same for all species. Refer to the Integrated Pest management Manual for the Presidio for specific information on the identification and biology of cockroach species.

The following management methods shall be used for cockroaches. Non-chemical controls shall be used in conjunction with pesticides.

MONITORING

Identify the problem cockroach species. Determine areas of heaviest infestations by using visual inspection for presence of roaches and evidence of roach activity, or by using sticky monitoring traps. Also, locate roach harborages in order to determine where to focus management activities. Continue monitoring after controls are initiated to evaluate treatment.

ACTION THRESHOLD

Control tactics shall be initiated when building occupants have seen cockroaches, or when traps placed out for one week continue to catch new roaches after the initial one week period.

EDUCATION

Reduce the roach carrying capacity of the environment by educating building occupants and encouraging them to place food in refrigerators or roach-proof containers, and to store garbage in sealed plastic bags.

PRIMARY COCKROACH CONTROL: NON-CHEMICAL

Reduce roach harborage (give priority to areas of highest populations):

- Caulk and paint gaps as small as 1/25th inch

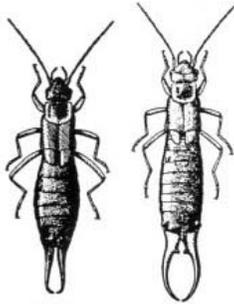
- Screen or caulk vents, windows, heating ducts, conduits, etc.
- Where gaps cannot be sealed (such as between a shelf and a wall), widen the gap to 1 inch or greater
- Proper food storage
- Trash management

SECONDARY COCKROACH CONTROL: PESTICIDES

For cockroaches, fipronil baits and gels, diatomaceous earth dust, deltamethrin, S-hydroprone, and boric acid are included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained before using any pesticides not included on the pre-approved pesticide list.

Pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

EARWIG MANAGEMENT



European Earwig female (left) and male (right). Illustration courtesy of Ohio State University Extension

On the Presidio, earwigs have generally been a pest only in homes and offices, and have not caused significant damage in the landscape. The most common species found in the park is the European earwig (*Forficula auricularia*). Earwigs do not present a real threat to human health or safety, but in large numbers may create a significant nuisance when they seek shelter inside buildings. When earwigs do invade homes, they can get into laundry, furniture, food, and even clothing and bedding. Fortunately, the damage by earwigs is generally much less severe than would be expected by the actual concentration of earwigs present.

Earwigs are mainly scavengers that generally live in or around the soil in decomposing organic matter. They are active at night and hide during the day in any dark, moist crevice, such as balled plants and boards. The eggs are laid in burrows in the ground. European earwigs exhibit one generation per year even though some females can produce two broods. In the first batch, females lay from 30 to 55 eggs. Fewer eggs are laid in the second batch. It is not uncommon to have isolated areas with high populations during periods of warm and humid weather.

The following management methods shall be used for earwig control. All non-chemical controls shall be given priority over the use of pesticides.

MONITORING

Determine areas of nesting outside a building by using visual inspection and probing plant material around the perimeter of a building, or by using sticky monitoring traps within a building. Locate earwig harborages in order to determine where to focus management activities. Earwigs can be found in large numbers under boards, in tree holes, under decaying bark, or wherever it is moist and dark. Continue monitoring after controls are initiated to evaluate treatment.

ACTION THRESHOLD

Control tactics shall be initiated when building occupants have seen earwigs, or when traps placed out for one week continue to catch new earwigs after an initial one week period.

EDUCATION

Reduce the earwig carrying capacity of the environment by educating building occupants and encouraging them to remove wood piles, cardboard, or debris from the ground

surrounding the building. Also, encourage them to move any planters or large objects away from the side of a building to reduce earwig harborage.

PRIMARY EARWIG CONTROL: NON-CHEMICAL

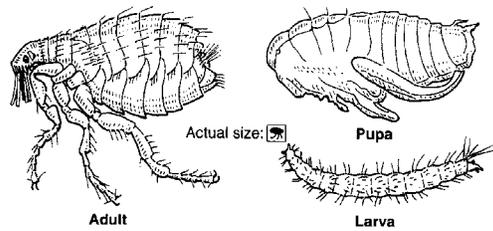
- Remove all debris (boards, stones, paper, etc.) from around the perimeter of the building
- Remove decaying vegetable matter around the home, such as piles of leaves or weeds.
- Repair poorly placed rain downspouts and broken irrigation systems, which contribute to moist, dark areas that are attractive to nesting earwigs.
- Caulk all cracks and crevices in the outside of the house and around windows.
- Since earwigs are attracted to light it may be necessary to reduce lighting around doors, or to use non-attractive (yellow) bulbs.
- Traps such as grooved-board traps or rolled-up newspaper traps set in shrubbery, in hedges, and around trees. These traps should be emptied at least twice each week by shaking the earwigs into a can containing a small amount of oil.

SECONDARY EARWIG CONTROL: PESTICIDES

For earwig control, orange oil spray, diatomaceous earth dust, and boric acid are included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

FLEA MANAGEMENT



Cat Flea life stages. Illustration courtesy of UC Statewide IPM Project

The flea most commonly found on the Presidio is the cat flea (*Ctenocephalides felis*), which may feed on cats, dogs, raccoons, humans and other mammals. Cat fleas have four stages in their development -- egg, larva, pupa and adult. The legless larvae which hatch from the eggs feed on excrement produced by the adult fleas and reach a length of about one-eighth inch. Outdoors these larvae develop in shaded soil and indoors they develop best in carpet. While under good conditions the larval stage takes only about a week, cool temperatures and low humidities can extend larval development for several weeks. The pupa develops and metamorphoses into an adult flea within a cocoon. This stage is the most variable in length as the adult remains within the cocoon, sometimes for months, until signaled to emerge by such stimuli as pressure or carbon dioxide.

Flea bites cause irritation to humans and pets, and can also cause serious allergies in some individuals.

The following management methods shall be used for fleas. Non-chemical controls shall be used in conjunction with pesticides.

MONITORING

Upon tenant complaints, positively identify the problem as a flea infestation. Monitor problematic buildings or rooms with flea traps. Continue monitoring after controls are initiated to evaluate treatment.

ACTION THRESHOLD

Control tactics shall be initiated when building occupants request control.

EDUCATION

If appropriate, educate building tenants about controlling these insects on their pets by combing with metal flea combs, or bathing pets with soap and water. Vacuuming carpets, floors, and upholstered furniture frequently can also reduce flea populations.

PRIMARY FLEA CONTROL: NON-CHEMICAL

Reduce flea populations:

- Screen vents, windows, heating ducts, conduits, etc. that may provide animals carrying fleas from entering the building

- Vacuum carpets to remove eggs and adults. Dispose of vacuum bag in a secured, double-bagged garbage bag. Repeat vacuuming may be necessary to remove adults newly emerged from the pupal stage.
- Flea traps

SECONDARY FLEA CONTROL: PESTICIDES

For flea control, diatomaceous earth dust, borate-based carpet treatments and methoprene are included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides, and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

GOPHER & MOLE MANAGEMENT



Pocket gopher (left) and gopher mound (right).



Mole (left) and mole mound (right).

Images courtesy of UC Statewide IPM Project

Pocket gophers and moles, which are native species, are found throughout the Presidio and are generally tolerated except when controls are required for Presidio ecosystem maintenance or when necessary to protect human safety, health, or property. These animals create mounds and underground tunnels near the soil surface, which create a hazard to park visitors. Pocket gophers are herbivores, feeding on a wide variety of vegetation, but generally preferring herbaceous plants, shrubs, and trees. Moles feed primarily on earthworms, grubs, wireworms, and adult beetles. They also feed on millipedes, slugs, snails, and earthworm cocoons and carrion.

Gophers or moles are not tolerated in areas where their mounds endanger pedestrians or structures. Management requires a high degree of sensitivity to the creatures' appeal to Presidio visitors and special status as native species, which suggests emphasis on habitat modification to discourage these animals rather than lethal control.

The following management methods shall be used for gophers and moles. All non-chemical controls shall be given priority over the use of pesticides.

MONITORING

Monitor to confirm the presence of gophers or moles. It is necessary to distinguish gopher mounds from mole hills. Gopher mounds tend to be made of finely sifted and cloddy soil that fans out from one side of the entrance hole. While the gopher is in its burrow system, the hole remains plugged. Gopher mounds are often built in a line and are usually larger and more flat than mole hills. Mole hills are volcano-shaped and often have a soil plug in the middle.

Record the location and number of mounds or sightings of gophers or moles in areas generating complaints.

ACTION THRESHOLD

Presidio Trust Grounds generally does not manage gophers or moles in native plant habitat or in the historic forest. While gophers or moles may be actively managed in these areas, the action threshold will be set on a case-by case basis, and may be as few as one gopher per site.

In the landscape vegetation areas actively managed by Presidio Trust Grounds, gophers or moles will only be controlled in specific locales:

- Historic landscape areas, including:
 - Golden Gate Club
 - WWII memorial
 - Main Post landscaping
 - Landscaping in historic residential neighborhoods, on an as requested basis
- Athletic and recreational areas, including:
 - Presidio Golf Course
 - Fort Winfield Scott baseball field
 - Pop Hicks field
 - Morton Street field
 - Paul Goode field
- New turf or landscape installations in a residential or commercial footprint

Gophers or moles do not need to be completely eradicated in all areas on the above list. When a population is small enough to be considered tolerable, Presidio Grounds may decide to level mounds instead of trapping or otherwise controlling gophers or moles. As a general guideline, up to four mounds per 200 ft² may be considered tolerable.

PRIMARY GOPHER OR MOLE CONTROL: NON-CHEMICAL

- Weed and irrigation management; gophers feed on fleshy roots, tubers, bulbs and seeds, keeping landscapes dry and with a low-level of fleshy roots can reduce gopher problems.
- Barriers: galvanized hardware cloth sunk into the soil around target plants, or wire mesh placed around irrigation fixtures prevents gopher damage.
- Trapping with below-ground traps where park visitors or other animals will not be exposed.
- Flooding burrows

SECONDARY GOPHER OR MOLE CONTROL: PESTICIDES

For gophers or moles, no pesticides are included on the current Pre-Approved Pesticide List. Trapping, flooding, and barriers are the best way to control gophers. Gopher baits (i.e. rodenticides) present serious risks of secondary poisoning of Presidio wildlife. However, in situations where a serious public health threat is documented, use of a rodenticide may be considered on a case-by-case basis (See Appendix B).

HOUSE MOUSE MANAGEMENT



House Mouse. Illustration courtesy of UC Statewide IPM Project

The Old World house mouse, *Mus musculus*, is a health threat worldwide. The house mouse is the only mouse species in the Presidio that has been commonly found infesting buildings.

Due to its small size, the house mouse can be even more difficult to control than Norway or roof rats. Overuse of poison baits has led to the development of resistant strains of mice no longer affected by the poison. Even when baits remain effective, poisoned rodents frequently die in inaccessible places such as wall voids where their decomposing bodies create unpleasant odors and feed pest insects such as flies. For these reasons, and because of the risk of human and other non-target species poisoning, habitat modification and trapping are the best approaches to long term mouse management.

The following management methods shall be used for house mice. All non-chemical controls shall be given priority over the use of pesticides.

MONITORING

Monitor to confirm mouse presence using visual inspection for droppings, or non-chemical bait blocks. Locate mouse food and harborage. Record this information on a map of the infested area.

ACTION THRESHOLD

Because of their damage to food and the potential health hazards they pose, the tolerance level for mice indoors and in the vicinity of structures outdoors is zero. Action should be taken when a single mouse is present

EDUCATION

It is important to educate building occupants of the reasons for keeping mice out of buildings and the need for their help in reducing the availability of food sources and nesting materials.

PRIMARY HOUSE MOUSE CONTROL: NON-CHEMICAL

Physical controls

Refer to *Mechanical Rodent Proofing Techniques* for effective rodent proofing techniques. This guide is available through the Presidio Trust IPM Coordinator.

- Reduce entry holes by sealing any holes 1/4 inch or larger, with rodent proofing material. For historic buildings, exclusion work shall be done from the inside of the building whenever possible, and according to the following guidelines:

- The primary method shall be to install a friction/compression fit steel mesh screen, using no adhesives, infill or other attachments. In situations where installing such friction/compression fit solution is not possible, either of the following rodent proofing techniques are approved for all Presidio structures (wood, concrete, plaster, stucco, stone, dead pipes):
- Steel mesh screen, or wood-framed steel mesh screen either stapled or adhered with mechanical fasteners (bolts, screws, etc) to concrete or mortar joints only - do not use adhesives of any kind
- Mortar infill which is softer than surrounding material (preferable Type "N")

The preceding three methods meet the Secretary of the Interior's Standards for Rehabilitation. For any rodent proofing of historic buildings that requires a more complicated solution than the methods described above, please contact the Federal Preservation Officer of Historic Compliance Coordinator for consultation.

- Mouse-proof food storage
- Install mouse barriers
- Mouse-proof garbage cans
- Reduce habitat with appropriate landscaping

Trapping

- Snap traps
- Live traps
- Electronic traps
- Glue boards

SECONDARY HOUSE MOUSE CONTROL: PESTICIDES

For house mice, no pesticides are included on the current Pre-Approved Pesticide List. Trapping and rodent-proofing structures are the best way to control house mice. However, in situations where a serious public health threat is documented, rodenticide may be considered on a case-by-case basis. (See Appendix B).

INSECT MANAGEMENT ON LANDSCAPE AND NURSERY PLANTS



Green peach aphid colony. Illustration courtesy of UC Statewide IPM Project

Insects such as aphids, scale, leafhoppers, and caterpillars may be common on ornamental landscape plants. The best defense against these pests is to maintain healthy plants, which can often withstand the presence of such pests without sustaining damage. The natural predators of these pests, including ladybeetles, parasitic wasps, ground beetles, and spiders are abundant in the Presidio, and can often keep pest populations in check.

Insect pests in lawns are not anticipated to be a significant concern on the Presidio. Turf throughout the Presidio, including on the golf course has been successfully managed without the use of insecticides. A healthy lawn, irrigated and fertilized properly will be able to withstand the presence of turf-feeding insects without sustaining damage.

The following management methods shall be used for landscape and nursery insect pests. All non-chemical controls shall be given priority over the use of pesticides.

MONITORING

Monitoring of new vegetative growth should be done in early spring. Monitoring for insect activity should be done periodically throughout the growing season. Identify insect species and note the severity of infestation. Recorded insect information allows the site manager to develop a history of an area. This will result in a more accurate prediction of future insect management needs.

ACTION THRESHOLD

Due to the wide range of possible insect pests, and the wide range of host plants, each with different pest tolerance levels, landscape crew members shall set action thresholds on a case-by-case basis. In general, if the insect does not pose a significant threat to the health of the plant, it shall be tolerated.

PRIMARY LANDSCAPE and NURSERY INSECT CONTROL: NON-CHEMICAL

- Avoid over-fertilizing
- Use proper irrigation
- Prune out infested plant material
- High power water sprays to remove insects
- Ant management (see Ant section) to keep ants from interfering with the natural enemy control of plant pests.

- Releases of biological control agents such as parasitic wasps may be considered, but may be of limited use in open landscape areas. The Presidio Trust IPM Coordinator must approve any releases prior to use through NEPA review.

SECONDARY LANDSCAPE and NURSERY INSECT CONTROL: PESTICIDES

For landscape and nursery insect pests, paraffinic oil, potassium salts/fatty-acids, *Bacillus thuringensis*, rosemary oil, extract of neem oil, capsaicin (hot pepper extract), and cinnamaldehyde, are included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Pesticides shall be used as spot-treatments to avoid unnecessary impacts on beneficial insect species. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used in accordance with their EPA-approved label directions. Protective gear as specified by the label directions shall always be worn when applying pesticides, and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

Precautions shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Outdoor pesticide sprays for landscape and nursery insect control shall not be performed when any of the following conditions exist:

- distance to surface water is less than fifty feet, or
- the application receives a Relative Aquifer Vulnerability Evaluation score of greater than 45 (see Appendix D), or
- rain is forecast within twenty-four hours, or
- wind speeds are greater than 10MPH.

MOSQUITO MANAGEMENT



Culex mosquito adult (left) and larvae (right). Illustration courtesy of UC Statewide IPM

The most important mosquitoes in the San

Francisco Bay Area belong to the genera *Aedes*, *Anopheles*, *Culex*, and *Culiseta*. Mosquitoes lay their eggs in or near water, or in areas where water occurs some time during the year. After the eggs hatch, larvae live and pupate in the water. Adult mosquitoes emerge from the pupal stage, and live on land.

Some mosquitoes feed during the day, some at dusk, and others at night. Adult mosquitoes are small (ranging from 1/8 to 3/4 of an inch long), slender, long-legged insects with a single pair of wings. All mosquitoes have a long piercing mouthpiece called a proboscis, which is used for feeding. Only adult female mosquitoes feed on blood. Because they feed on blood, they can be carriers of disease such as malaria, viral encephalitis, and dog heartworm.

The Presidio's climate is generally not warm enough to produce extremely large populations of mosquitoes, but they do occur seasonally in the park. The largest numbers of adult mosquitoes generally emerge in early spring through late summer. In response to the threat of West Nile virus in the Bay Area, the Presidio Trust developed a West Nile Virus Risk Reduction plan, which addresses mosquito management throughout area B of the Presidio (i.e. not just in cultural landscapes). Please refer to that document, available through the Presidio Trust IPM Coordinator, for more detailed information.

MONITORING

Monitoring shall occur during times of major adult mosquito activity, through the use of dip cups and carbon dioxide traps.

ACTION THRESHOLD

If mosquito species are present which pose a significant health threat to park visitors or tenants, larvae or pupae may be controlled.

Personal mosquito repellent may be used by Trust Grounds staff when they will be working in areas with mosquito populations.

EDUCATION

It is important to educate building occupants about their role in minimizing mosquito breeding areas. Tenants should be asked to dispose of cans, tires, buckets, unused plastic

swimming pools or other containers that collect and hold water. Tenants should not allow water to accumulate in the saucers of flowerpots or in pet dishes for more than five days.

PRIMARY MOSQUITO CONTROL: NON-CHEMICAL

- Remove any containers or debris that could hold standing water.
- Clean debris from rain gutters and remove any standing water under or around structures, or on flat roofs.
- Grading roads or trails to fill in areas of standing water.
- Improve drainage in landscaped areas to alleviate a standing water problem.

SECONDARY MOSQUITO CONTROL: PESTICIDES

For mosquito control, DEET, refined larvecidal oil and *Bacillus thuringiensis* subspecies *israelensis* and *Bacillus sphaericus* are included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides, and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

PIGEON MANAGEMENT



Pigeon.

Illustration courtesy of UC Statewide IPM Project

The feral pigeon, *Columbia livia* (also known as rock doves or domestic pigeons), are the primary pest bird in the Presidio. They not only make themselves a nuisance by their roosting and nesting activity and their noisy behavior, but they also carry and transmit a variety of human and avian diseases. They also harbor a number of external parasites, which are known to attack humans. The feral pigeon is sometimes confused with the mourning dove. However, mourning doves are more solitary and do not congregate in large flocks. The mourning dove, a native species, is smaller, buff-colored, with long, central tail feathers.

In the past, pigeon control in the United States has focused on poison baiting, trapping, and nest destruction, but today IPM programs concentrate more on exclusion and habitat reduction. The following management methods shall be used for pigeons.

MONITORING

Monitor to determine roosting, loafing, feeding, and nesting sites. Visual inspection is the most useful monitoring technique for pigeons. It is probable that more than one visit to the site will be necessary to determine the size of the population, the extent of the damage, and the best method for controlling the pigeons.

ACTION THRESHOLD

The action threshold is zero for pigeons on buildings where their droppings fall on stairs or walkways and endanger pedestrians, or in other areas where their droppings deface property or cause secondary problems such as clogged gutters and downspouts. Higher numbers of pigeons can be tolerated if they are loafing (i.e., not nesting) on rooftops (except roofs with heating or air conditioning equipment), but not on window ledges or other surfaces that can be damaged by their droppings. In general, pigeons that are loafing but not roosting can be tolerated at fairly high numbers.

Because nesting pigeons remain at a site permanently, and because they have a propensity to congregate in colonies, it is reasonable to assume that once a few pigeons establish themselves at a site, the total population will quickly enlarge. Early action to discourage nesting is imperative if pigeon numbers are to be kept to low levels.

EDUCATION

It is important to educate building occupants and other people in the area about their roles in solving a pigeon problem. Feeding pigeons shall be discouraged, and is against Presidio regulations.

PIGEON CONTROL: NON-CHEMICAL

Physical control:

- Sanitation
- Prohibit feeding
- Dropping and debris removal
- Nest removal

Exclusion:

- Bird netting
- Porcupine wire
- Piano-type wire
- Grounded electrical wires (on roof-tops)
- 45° angle ramps
- Non-toxic repellants
- Eliminate pea-gravel on roof-tops

PESTICIDES

For pigeons, no pesticides are included on the current pre-approved list. Physical control and exclusion are the best way to control pigeons. Avicides present serious risks of secondary poisoning of Presidio wildlife, and have proven inadequate even in most situations where they have been properly implemented.

RACCOON MANAGEMENT



Raccoon.

Illustration courtesy of UC Statewide IPM Project

Raccoons (*Procyon lotor*) are among the most populous native wildlife inhabiting the Presidio. They are a native species and are generally tolerated except when controls are required for Presidio ecosystem maintenance or when necessary to protect human safety, health, or property. Presidio visitors and staff generally consider raccoons a very attractive form of wildlife. But in proximity to human-occupied facilities raccoon presence can range from simple nuisance to a public health threat. Management requires a high degree of sensitivity to the raccoons' public appeal and special status as a native species, which suggests emphasis on habitat modification to discourage these animals rather than lethal control.

The following management methods shall be used for raccoons.

MONITORING

Monitor areas where complaints have been received about nuisance or sick raccoons to confirm raccoon presence and activities. Record confirmed sightings, actions taken, and results.

ACTION THRESHOLD

Unless individual raccoons pose a health or safety threat they should be tolerated outdoors. Measures to reduce populations should only be taken against individual animals causing problems. If raccoons are denning under structures, action should be taken to seal off entry points due to the potential structural damage they can cause and the diseases they are capable of transmitting.

EDUCATION

Educate building occupants or others reporting raccoon problems about the need to eliminate animal access to food and habitat and ask for their cooperation.

RACCOON CONTROL: NON-CHEMICAL

Physical controls:

- Reduce or eliminate raccoon access to food from garbage cans, pet food cans, or other human generated wastes by securing lids of waste containers with spring closures or fastening them to fixed stations
- Seal possible building entry sites. On historic buildings, the primary method shall be to install a friction/compression fit steel mesh screen, using no adhesives, infill or

other attachments. In situations where installing such friction/compression fit solution is not possible, either of the following rodent proofing techniques are approved for all Presidio structures (wood, concrete, plaster, stucco, stone, dead pipes):

- Steel mesh screens, or wood-framed steel mesh screen either stapled or adhered with mechanical fasteners (bolts, screws, etc) to concrete or mortar joints only - do not use adhesives of any kind
- Mortar infill which is softer than surrounding material (preferable Type "N")

The preceding three methods meet the Secretary of the Interior's Standards for Rehabilitation. For any work on an historic building that requires a more complicated solution than the methods described above, please contact the Federal Preservation Officer or Historic Compliance Coordinator for consultation.

- Place metal guards on tree trunks, drainpipes, or other climbing routes
- Remove any brush piles near buildings
- Live-trap overly aggressive or notorious problem raccoons that continue to pose serious health or property damage risks. Relocate them elsewhere in the Presidio property.

PESTICIDES

For raccoon control, no pesticides are or will be approved for use.

RAT MANAGEMENT



Norway Rat and droppings (top); Roof Rat and droppings (bottom). Illustrations courtesy of UC Statewide IPM Project

Rat populations are well established at the Presidio. The two most important rat species occurring at the Presidio are the Norway rat, *Rattus norvegicus*, and the roof rat, *Rattus rattus*. They are attracted to any area that provides accessible hiding places with easy access to food. They are frequently found in food service areas, warehouses, office buildings, residential quarters, and heavily vegetated landscapes adjacent to garbage collection and storage areas, creeks or other water sources. Serious rat infestations indicate chronic problems with garbage and/or sewage management.

The key to successful long-term rat management is to reduce the capacity of the environment to support rats. An IPM approach combines careful inspection, regular monitoring, sanitation, trash management, rat-proofing structures, and trapping. For effective rodent proofing techniques refer to *Mechanical Rodent Proofing Techniques*, a guide available through the Presidio Trust IPM Coordinator.

The following management methods shall be used for rats. All non-chemical controls shall be given priority over the use of pesticides.

MONITORING

Monitor to confirm rat presence, identify species, and locate food and harborage. Record this information on a map of the infested area. Note signs of rat presence including fecal droppings, tracks, urine, runs or burrows, grease marks or rubs, gnaw marks, and noises.

If no signs are detected, but a rat has been seen in the area, there are probably fewer than five rats in the area. If old droppings and gnaw marks are obvious, but no rats are observed in the daytime, but one is spotted at night, there are probably five or more rats in the area. If fresh droppings, tracks and gnawing marks, with three or more rats seen at night at any one time, or any seen in daylight, there are probably more than fifteen rats in the area. Non-toxic baits can be placed in areas that are likely to experience infestations, to detect rat presence before they would be detected otherwise.

ACTION THRESHOLD

Because of the potential health hazards and nuisance value they pose, the action threshold for rats indoors and in the vicinity of structures and waste receptacles outdoors is zero. Action should be taken when a single rat is present

EDUCATION

Presence of rats usually indicates a waste management problem. Cooperation of building occupants, custodians, groundskeepers, and sanitation workers will be needed to reduce food sources and harborage supporting rats. The most important objective should be to educate people that unless the food sources generated by building occupants are reduced, it will be very difficult to solve a rat problem in the long term.

PRIMARY RAT CONTROL: NON-CHEMICAL

Physical controls

Refer to *Mechanical Rodent Proofing Techniques* for effective rodent proofing techniques. This guide is available through the Presidio Trust IPM Coordinator.

- Reduce entry holes by sealing any holes 1/2 inch or larger, with rodent proofing material. For historic buildings, exclusion work shall be done from the inside of the building whenever possible, and according to the following guidelines:
 - The primary method shall be to install a friction/compression fit steel mesh screen, using no adhesives, infill or other attachments. In situations where installing such friction/compression fit solution is not possible, either of the following rodent proofing techniques are approved for all Presidio structures (wood, concrete, plaster, stucco, stone, dead pipes):
 - Steel mesh screen, or wood-framed steel mesh screen either stapled or adhered with mechanical fasteners (bolts, screws, etc) to concrete or mortar joints only - do not use adhesives of any kind
 - Mortar infill which is softer than surrounding material (preferable Type "N")

The preceding three methods meet the Secretary of the Interior's Standards for Rehabilitation. For any rodent proofing of historic buildings that requires a more complicated solution than the methods described above, please contact the Federal Preservation Officer or Historic Compliance Coordinator for consultation.

- Reduce food availability, including fixing water or sewage pipe leaks.
- Rat-proof building exteriors
- Trash management
- Rat-proof garbage cans
- Reduce dense ground-cover vegetation
- Trim bushes and grass away from buildings to create a 12-inch to 18-inch space of open ground.

Trapping

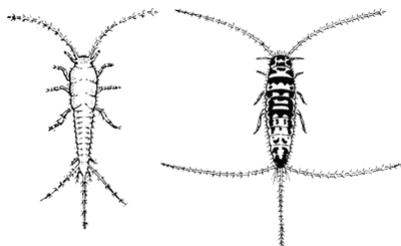
If rats have been seen in the area, trapping must be used in conjunction with Physical controls.

- Snap traps
- Box traps
- Electronic traps
- Glue boards

SECONDARY RAT CONTROL: PESTICIDES

For rats, no pesticides are included on the current Pre-Approved Pesticide List. Trapping and rodent-proofing structures are the best way to control rats. Rodenticides present serious risks of secondary poisoning of Presidio wildlife. However, in situations where a serious public health threat is documented, use of a rodenticide may be considered on a case-by-case basis (See Appendix B).

SILVERFISH AND FIREBRAT MANAGEMENT



Silverfish (left) and firebrat (right). Illustration courtesy of UC Statewide IPM Project

Silverfish and firebrats are both are slender, wingless, soft-bodied insects 1/3 to 1/2 inch long.

Silverfish are shiny, silver gray, and firebrats are shiny, mottled gray. They have scaly bodies that taper gradually to the rear with two slender antennae in front and three long, thin appendages in back. They feed on moist wheat flour, books, any paper on which there is glue or paste, sizing in paper and book-bindings, and starch in clothing. They can live for several months without food.

Silverfish live and develop in damp, cool places. Firebrats thrive best in very warm, moist places. They may be found around heating units, or around hot water pipes. They may crawl along pipelines and through openings in the walls or floors from basements to rooms above. Because they are seeking food, they choose places where books, clothing, starch, or sugar foods are available. They hide in baseboards and around window and doorframes from which they seek out food sources.

Both these insects can cause similar damage. Book-bindings will show minute scrapings, and the edges of paper will appear notched. In cases of high populations irregular holes will be eaten directly through paper. Other signs of feeding include feces, scales, and small yellow stains.

MONITORING

Use sticky traps and visual observation for insect droppings to monitor the building for the presence of these pests. Traps should be checked on at least a weekly basis.

ACTION THRESHOLD

Control tactics shall be initiated when tenants request control.

PRIMARY SILVERFISH OR FIREBRAT CONTROL: NON-CHEMICAL

- Caulking building cracks and crevices with silicone caulking compound
- Vacuuming or sanitizing building cracks and crevices, and areas along baseboards and around heaters where hair and debris accumulate
- Dehumidify a room by fixing any water leakage problems, increase air circulation, or use a dehumidifier. These insects cannot thrive in an environment of less than 70% relative humidity.

- If feasible, infested items may be microwaved for thirty to 60 seconds to kill the insects
- Removal of an infested item for heat or freezing treatment to kill the insects

SECONDARY SILVERFISH OR FIREBRAT CONTROL: PESTICIDES

For silverfish and firebrats, orange oil spray, diatomaceous earth dust, and boric acid are included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

SKUNK MANAGEMENT



The striped skunk. Illustration courtesy of UC Statewide IPM Project

The striped skunk (*Mephitis mephitis*), is the skunk species occurring in the Presidio. They are nocturnal, hunting at night for eggs in wildlife nests, insects, grubs, small rodents, snakes, frogs, mushrooms, berries and fruit, pet food, bird food, and garbage. They are a native species and are generally tolerated except when controls are required for Presidio ecosystem maintenance or when necessary to protect human safety, health, or property.

Breeding usually occurs during February and March for the striped skunk; gestation time is about 9 weeks and litters range from four to six kits. Skunks often den in burrows, but because they prefer to do as little digging as possible, they will use abandoned burrows dug by ground squirrels, fox, or coyotes, enlarging them only if necessary. If dens are scarce, they will readily use brush piles, hollow logs, and space under decks, porches, or beneath buildings.

Skunks have a powerful scent gland that can shoot their scent as far as 6 to 10 feet. The secretion is acrid enough to cause nausea and can produce severe burning and temporary blindness if it strikes the eyes. In California they are primary carriers of rabies. Skunks are also carriers of other diseases including leptospirosis, listeriosis, canine distemper, canine hepatitis, Q-fever, and tularemia.

Presidio visitors and staff generally consider raccoons an intriguing form of wildlife. But in proximity to human-occupied buildings skunk presence can range from simple nuisance to a public health threat. Management requires a high degree of sensitivity to the skunk's public appeal and special status as a native species, which suggests emphasis on habitat modification to discourage these animals rather than lethal control. The following management methods shall be used for skunks.

MONITORING

Monitor areas where complaints have been received about nuisance skunks to confirm skunk presence and activities. Record confirmed sightings, actions taken, and results.

ACTION THRESHOLD

Measures to control skunk activity should only be taken against individual animals causing property or health concerns. If skunks are denning under structures, action should

be taken to remove the animals and seal off entry points due to the potential structural damage they can cause and the diseases they are capable of transmitting.

EDUCATION

Educate building occupants or others reporting skunk problems about the need to eliminate animal access to food and man-made habitat.

SKUNK CONTROL: NON-CHEMICAL

Physical controls:

- Reduce or eliminate skunk access to food from garbage cans, pet food cans, or other human generated wastes by securing lids of waste containers with spring closures or fastening them to fixed stations
- Remove skunks from within structures by using a live trap, or by installing a one-way outward swinging gate on the structure. If a live trap is used, relocate the skunk elsewhere in the Presidio.
- Seal possible building entry sites. On historic buildings, the primary method shall be to install a friction/compression fit steel mesh screen, using no adhesives, infill or other attachments. In situations where installing such friction/compression fit solution is not possible, either of the following rodent proofing techniques are approved for all Presidio structures (wood, concrete, plaster, stucco, stone, dead pipes):
 - Steel mesh screens, or wood-framed steel mesh screen either stapled or adhered with mechanical fasteners (bolts, screws, etc) to concrete or mortar joints only - do not use adhesives of any kind
 - Mortar infill which is softer than surrounding material (preferable Type "N")

The preceding three methods meet the Secretary of the Interior's Standards for Rehabilitation. For any work on an historic building that requires a more complicated solution than the methods described above, please contact the Federal Preservation Officer of Historic Compliance Coordinator for consultation.

- Place metal guards on tree trunks, drainpipes, or other climbing routes.
- Remove any brush piles near buildings.
- Live-trap overly aggressive or notorious problem skunks that continue to pose serious health or property damage risks. Relocate them elsewhere in the Presidio property.

PESTICIDES

For skunk control, no pesticides are or will be approved for use.

SLUG AND SNAIL MANAGEMENT



The brown garden snail. Illustration courtesy of UC Statewide IPM Project

The brown garden snail (*Helix aspersa*), is the common snail in the Presidio. Several species of slugs are frequently damaging, including the gray garden slug (*Peroceras reticulatum*), and the banded slug (*Limax poirieri*). Snails and slugs feed on a variety of living plants as well as on decaying plant matter. They can also chew fruit and young plant bark. Because they prefer succulent foliage, they are primarily pests of seedlings and herbaceous plants. However, they will also feed on foliage and fruit of some trees.

Snails and slugs are most active at night and on cloudy or foggy days. On sunny days they seek hiding places out of the heat and sun; often the only clues to their presence are their silvery trails and plant damage. In mild-winter areas such as the Presidio, young snails and slugs are active throughout the year.

The following management methods shall be used for slugs and snails. All non-chemical controls shall be given priority over the use of pesticides.

MONITORING

Identify all places where snails or slugs can hide during the day. Boards, stones, debris, weedy areas around tree trunks, leafy branches growing close to the ground, and dense ground covers such as ivy are ideal sheltering spots.

ACTION THRESHOLD

Due to the wide range of host plants, each with different tolerance levels, landscape crew members will need to set action thresholds on a case-by-case basis. In general, if the slugs or snails do not pose a significant threat to the health of the plant, they shall be tolerated.

PRIMARY SLUG AND SNAIL CONTROL: NON-CHEMICAL

- Eliminate, to the extent possible, all places where snails or slugs can hide during the day such as boards, stones and weedy areas. Eliminate as many of these areas as possible. There will be shelters that are not possible to eliminate-- e.g., low ledges on fences, the undersides of wooden decks, and water meter boxes. Make a regular practice of removing snails and slugs in these areas. Reducing hiding places allows

fewer snails and slugs to survive. The survivors congregate in the remaining shelters, where they can more easily be located and controlled.

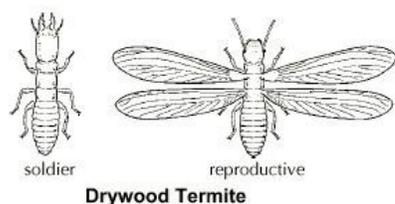
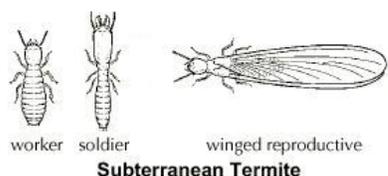
- Traps such as boards, flowerpots, etc, placed away from the affected plants can be used to attract large numbers of slugs and snails which can then be disposed of.
- Use drip irrigation instead of sprinklers to reduce humidity and moist surfaces, making the habitat less favorable
- Copper barriers
- Sticky barriers on tree or shrub trunks
- Hand picking

SECONDARY SLUG AND SNAIL CONTROL: PESTICIDES

For slugs and snails, iron phosphate is included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

TERMITE MANAGEMENT



Important California termite species. Illustration courtesy of UC Statewide IPM Project

To date, only subterranean and dampwood termites have been reported at the Presidio, although drywood termites are also known to infest buildings in the San Francisco Bay area. Management of all three species is covered here.

The following management methods shall be used for termites. All non-chemical controls shall be given priority over the use of pesticides.

MONITORING

Inspect buildings to determine general physical condition of the structure. Identify the termite species involved, the extent of the termite damage, and the extent of any water related damage. Dog assisted inspections, or the use of moisture meters or non-chemical monitoring stakes will improve accuracy in pinpointing termite infestations. Record inspection results on site maps.

ACTION THRESHOLD

The tolerance level for this pest is zero; control tactics are initiated when the pest is discovered infesting a building.

EDUCATION

Where possible, educate custodial and maintenance staff about conditions that favor termite infestations. Request that they inform the pest manager of these conditions. If necessary, educate occupants and maintenance staff about termite biology, prevention and treatment.

PRIMARY TERMITE CONTROL: NON-CHEMICAL

Make repairs to structures to improve drainage, eliminate excess moisture problems, eliminate soil-wood contacts, and eliminate holes and cracks in the structure (foundation, siding, trim). Replace wood heavily damaged by termites. Replace wood in-kind. For termite damage to historic structures, all repairs must meet the Secretary of the Interior's Standards for Rehabilitation.

For drywood termites, treatment options include:

- Heat
- Electricity
- Microwaves
- Desiccating dusts

For subterranean termites, treatment options include:

- Scraping down shelter tubes
- Installing sand barriers
- Borate-based wood treatments

For dampwood termites, treatment options include:

- Rectifying moisture problems
- Breaking soil to wood contact
- Replacing damaged wood with borate-treated wood.

SECONDARY TERMITE CONTROL: PESTICIDES

For termites, boric acid is included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

WEED MANAGEMENT IN CULTURAL LANDSCAPES



English daisy. Illustration courtesy of UC Statewide IPM Project

Weeds are generally described as any plants growing where they are not wanted. Some weeds are more problematic than others due to their invasive nature and tendency to displace native species. For the purpose of this plan, weeds can be divided into four general groups:

- invasive exotic weeds,
- general weeds in cracked concrete or along sidewalks or roads,
- general weeds in landscape plantings, and
- general weeds in turf.

It is impossible to completely eradicate weeds in any irrigated landscape; weeds will invade man-made environments wherever they are established. The best defense against weeds is healthy landscape plants, or healthy turf with a high mowing height. The most obvious impact of weeds in landscaping and in turf areas is the competition with and replacement of desirable species by weed species.

The major weed species affecting landscaped areas in the Presidio are English daisy (*Bellis perennis*), white clover (*Trifolium repens*), kikuyugrass (*Pennisetum clandestinum*), annual sowthistle (*Sonchus oleraceus*), and mallow (*Malva paviflora*). However, many other weed species are common. Weeds can be grouped according to their lifecycles, including summer annuals, winter annuals, intermediate annuals, biennial, and perennial weeds. Knowledge of the life cycle of a particular weed species is an important part of its management. Resources which contain this information include:

- UC Pest Management Guidelines:
<http://www.ipm.ucdavis.edu/PMG/selectnewpest.turfgrass.html>
- *Weeds of the West*, Tom D. Whitson *et al.* University of Wyoming, 1993. Available through The Presidio Trust IPM Coordinator.
- *The Growers Weed Identification Handbook*, UC Division of Agriculture and Natural Resources Publication 4030. Available through The Presidio Trust IPM Coordinator.

The following management methods shall be used for weeds. Non-chemical controls shall be given priority over the use of pesticides.

MONITORING

Monitoring for actively growing weeds should be done periodically throughout the growing season. Less frequent inspections should be made during winter and early spring to identify sites of soil disturbance or other adverse effects, which may give rise to future weed problems. Identify weed species and note percentage weed cover in landscaped areas and turf. Recorded weed information allows the site manager to develop a weed history of an area. This will result in a more accurate prediction of future weed management needs.

Weeds are most likely to be found in areas where some type of disturbance has taken place, such as areas of soil compaction, areas of open soil, worn areas on athletic fields, or areas of soil moisture extremes. In turf, weeds are likely to grow in areas that have been stressed. This could be the result of being mowed too short, heavy thatch accumulation, competition from trees, or insect or disease attack. Turf can be stressed from extremes in soil pH or the accumulation of road salts along roadways as well. "Dog blight" from animal urine, fertilizer spills or misuse, localized wet or dry spots, or accumulations of debris can create open areas where weed infestations begin. Edging along walkways may also open up areas of bare soil where weed seeds can germinate.

ACTION THRESHOLDS

INVASIVE EXOTIC WEEDS

Invasive exotic weeds such as kikuyugrass (*Pennisetum clandestinum*) and cape ivy (*Senecio mikanioides*) present a significant threat to native plant habitat throughout the park, and thus have a lower action threshold than non-invasive exotic weeds. Invasive exotics may be controlled with both non-chemical and chemical means whenever they are present in the landscape; the action threshold for such weeds is zero.

WEEDS IN CONCRETE SURFACES OR ALONG SIDEWALK AND ROADS

Weeds in concrete surfaces shall be controlled as they occur. Flaming shall be used to control weeds in these areas where it is safe to do so. In areas where it is unsafe to use a weed flamer, chemical control may be used.

WEEDS IN ORNAMENTAL LANDSCAPE PLANTINGS

Weeds in ornamental landscape plantings shall be controlled with non-chemical methods if they cover less than a 10% portion of a landscaped area. Large weeds unfeasible for mechanical removal (e.g. eucalyptus stumps areas inaccessible to a stump grinder, or poison oak) may be controlled chemically.

WEEDS IN TURF

Weeds in turf shall be controlled with non-chemical methods if they cover less than 15% of a high visibility lawn (limited to athletic field turf, Main Post lawns, and Funston Street lawns), or less than 25% of any other lawn.

PRIMARY WEED CONTROL: NON-CHEMICAL

LANDSCAPE PLANTINGS & CONCRETE SURFACES OR ALONG SIDEWALK AND ROADS

- Geotextile or landscape fabrics
- Mulches such as wood chips
- Cultivation
- Hand weeding
- Stump grinding
- Flame, heat, or hot water treatment.

TURF

- Keep mowing-height at 2 inches or greater. Recommended mowing height for athletic fields is at least 2 inches, and 3 inches to 4 inches for other turf.
- Proper fertilization
- Proper irrigation
- Aeration and overseeding
- Hand weeding
- Flame, heat, or hot water treatment.

Weed Flamers:

All weed flaming shall be carried out under the guidelines set forth by the Presidio Fire Department which stipulate the following:

- Weed flamers shall not be used in wind speeds greater than 10MPH
- A fire extinguisher shall be present at all times during work.
- Flaming shall take place no closer than fifteen feet from any structure or vehicle.
- The work area shall be checked for smoldering debris when work is completed.
- The Presidio Fire Department must be notified by fax (415/561-5105) of the location of all flaming work before it is done.

SECONDARY WEED CONTROL: PESTICIDES

For weeds, acetic acid, corn gluten meal, glyphosate, and triclopyr ester are included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used properly and in accordance with their EPA-approved label directions. Protective gear as specified by the label directions shall always be worn when applying pesticides, and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides. Precautions shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Outdoor pesticide sprays for weeds shall not be performed when any of the following conditions exist:

- distance to surface water is less than fifty feet, or

- the application receives a Relative Aquifer Vulnerability Evaluation score of greater than 45 (see Appendix D), or
- rain is forecast within twenty-four hours, or
- distance to special status plant species (see map in Appendix E) is less than twenty feet
- wind speeds are greater than 10MPH.

However, when a pesticide is being applied through a wick, sponge, or brush applicator directly to a weed, the only restriction shall be no applications when rain is forecast within twenty-four hours.

YELLOWJACKET AND HORNET MANAGEMENT



Yellowjacket. Illustration courtesy of UC Statewide IPM Project

Yellowjackets and hornets are both beneficial and problematic. Although they are predators and scavengers, they can establish their nests near and within human habitation where they may sting people or pets when disturbed. Yellowjackets can cause problems whenever food is being consumed outside because they persistently search out protein-rich and sugary food and drinks.

Distinguishing yellowjackets and hornets from bees and other large wasps is essential when managing wasp pest problems. Paper wasps, for example, include some benign and some mildly aggressive species. For the most part they do not need to be killed and should be tolerated for their beneficial role in controlling pest flies and caterpillars. The giant hornet is also commonly killed, yet poses little danger from stings. Its large size and aggressive flying behavior in defense of nest locations makes it appear threatening. Honeybees and their hives also should not be killed. If a beehive is causing a nuisance, the San Francisco Beekeepers Association can be called to remove the hive. Contact the Presidio Trust IPM Coordinator for contact information.

The following management methods shall be used for yellowjackets and hornets. Non-chemical controls shall be given priority over the use of pesticides.

MONITORING

After a complaint is received, confirm the identification of the offending insect, if it is a honeybee or non-threatening wasp species, do not kill the insects (see above).

If there is a chronic problem with yellowjackets, inspect the area methodically to locate the nests. Ground nests are frequently located under shrubs, logs, piles of rocks, and other protected sites, but they can also be out in open unprotected areas. Entrance holes sometimes have bare earth around them.

At present, yellow jacket traps are most useful in providing temporary relief from the insects and are not generally used to monitor population levels.

ACTION THRESHOLD

Control shall be initiated when yellowjackets or hornets present a human health risk.

EDUCATION

It may be important to educate building occupants about the difference between yellowjackets and bees or wasps. Education about food waste management may also help alleviate a problem.

PRIMARY YELLOWJACKET AND HORNET CONTROL: NON-CHEMICAL

Physical controls

- Reduce food availability
- Food waste management
- Keep building holes repaired and caulk entry points in siding
- Food-bait traps
- Physically remove nests with high pressure water spray
- Vacuum nests

SECONDARY YELLOWJACKET AND HORNET CONTROL: PESTICIDES

For yellowjackets and hornets, an aerosol phenothrin is included on the current Pre-Approved Pesticide List. See Appendix A for specific products. Pesticides may only be used when non-chemical methods have proven ineffective or unfeasible, and when yellowjackets or hornets present a threat to human health and safety. Approval must be obtained before using any pesticides not included on the Pre-Approved Pesticide List.

Pesticides must be used in accordance with their EPA-approved label directions. Precautions as specified by the label shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur. Protective gear as specified by the label directions shall always be worn when applying pesticides and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides.

APPENDIX A

PRE-APPROVED PESTICIDES

The pesticides in the following table have been evaluated and approved for use in the Presidio Area B. Pesticides must be used in accordance with their EPA-approved label directions. Protective gear shall always be worn when applying pesticides and applicators shall be certified by the California Department of Pesticide Regulation to apply pesticides. Precautions shall be taken to ensure that drift, runoff, and contact with non-target organisms does not occur.

CATEGORY	PRODUCT NAME	ACTIVE INGREDIENT	EPA REGISTRATION NUMBER
Fungicide/Insecticide	Cinnamite	Cinnamaldehyde	58866-12-ZA-65626
	Saf-T-Side	Paraffinic oil	48813-1-AA-4813
	Triact 70	Extract of Neem oil	70051-2-59807
Herbicide	Bioweed	Corn gluten meal	1051098-3001-AA
	Roundup Pro	Glyphosate	524-475-ZA-524
	Turflon	Triclopyr ester	62719-258
Insecticide	Agnique	Refined oil	53263-28
	Borid	Boric acid	9444-129-2A-9444
	Dipel 2X	<i>Bacillus thuringensis</i>	257-37-AA-275
	EcoExempt IC	Rosemary oil	Exempt from EPA registration
	EcoPCO	Hexa-hydroxyl plant oils	67425-X
	Fleanix	Borate	67419-1
	Gentrol	(S)-Hydroprene	2724-351
	Hot Pepper Wax	Capsaicin	67238-1
	Insecolo	Diatomaceous earth	66923-1-AA
	Maxforce ant bait	Fipronil	64248-21
	Maxforce roach bait	Fipronil	64248-11-AA-64248
	Maxforce roach killer gel	Fipronil	64248-14
	M-Pede	Potassium salts/ fatty acids	53219-6-AA-53219
	Orange Guard	D-Limonene	61887-1-AA
	PowerDEET 25	DEET	50830-3
	Precor 2000	Methoprene, Permethrin	2724-483
	Suspend	Deltamethrin	432-763
	Terro Ant Killer2	Sodium tetraborate	54-192
	Vectobac	<i>Bacillus thuringensis</i> var. <i>israelensis</i>	73049-38
	Vectolex	<i>Bacillus sphaericus</i>	275-13573049-20
Wasp Freeze	D-trans allethrin and phenothrin	499-362	
Molluscicide	Sluggo	Iron Phosphate	67702-3-11656

APPENDIX B

Consideration of Pesticides Not on Pre-Approved Pesticide List

Use of any pesticides not on the current Pre-Approved Pesticide List shall be prohibited without prior approval after review by an ad hoc committee consisting of the Presidio Trust IPM Coordinator, the Presidio Trust NEPA Compliance Manager, and a representative from the Presidio Trust Real Estate department. Approval shall be considered only in instances where control methods and pesticides on the Pre-Approved Pesticide List have proven ineffective in addressing the problem.

Determining Whether Use of Another Pesticide Can Occur

Pesticides not on the current Pre-Approved Pesticide List will be approved for use only where there is no potential for significant environmental impact. In making this determination, the Trust shall consider the location of the intended application, whether it is interior (to a building or structure), any potential for uncontrolled human contact, and any potential for interaction with natural resources, including plants, animals, surface water, and groundwater. (See RAVE explanation, Appendix D, for consideration of groundwater.) Approvals shall be conditioned upon any measures required to minimize risks.

APPENDIX C

Notice of Intent to Apply a Pesticide

The area indicated below is scheduled to be treated with a pesticide. As with all pesticide use in the Presidio, this pesticide application has been evaluated and determined to present no significant risk to people, wildlife, or other natural resources.

Pesticide Name: _____

Pesticide EPA Number: _____

Pesticide Signal Word: _____

Date and Time of Scheduled Application:

Area to be Treated: _____

Contact for More Information: _____

APPENDIX D

Relative Aquifer Vulnerability Evaluation (RAVE)

(Adapted from the Users Guide for the Vegetation Management Risk Assessment Risk Assessment for Herbicide Use in Forest Service Regions 1,2,3,4, and 10 and on Bonneville Power Administration Sites December 1992. The USFS adapted their RAVE from the Montana Department of Agriculture, Environmental Management Division.)

Introduction

To help reduce the potential for contaminating groundwater with pesticides, an aquifer vulnerability scoring system – Relative Aquifer Vulnerability Evaluation (RAVE) is used. This numeric scoring system will help evaluate pesticides for on-site groundwater contamination potential. The use of the score card may indicate whether an alternative pesticide should be used within a given area or if the area is not suited to pesticide applications, other control methods should be used such as mechanical, cultural, or biological. RAVE is designed only as a guidance system and does not replace the need for safe and judicious pesticide application required in all situations.

Several major factors in a particular area determine the relative vulnerability of groundwater to pesticide contamination. Nine of these factors have been incorporated into the following RAVE score card and are defined below

Factor Definitions

Depth to Groundwater:	Distance in vertical feet below the soil surface to the water table.
Soil Texture:	Soils predominately gravelly, sandy, loamy, or clayey.
Percent Organic Matter:	The relative amount of decayed plant residue in the soil may be estimated by soil color (darker soil generally indicates higher organic matter) or by laboratory analysis.
Topographic Position:	Physical surroundings of the field to which the pesticide application is to be made. Flood Plain = within a river, stream or lake valley, Alluvial Fan or Bench = lands immediately above a river or lake valley but may still have some riparian vegetation, Upland Habitat = uplands above a floodplain or alluvial bench, Transition zone = land not immediately affected by open water.
Distance to Surface Water:	Distance in feet from treatment boundary to the nearest flowing or stationary surface water.
Annual Precipitation:	Over 60" annual precipitation, 30-60" annual precipitation, less than 30" annual precipitation on the treatment site.
Pesticide Application Frequency:	Number of times the particular pesticide is applied during one year.
Pesticide Application Method:	Whether the pesticide is applied to the soil or to the plant.
Pesticide Leachability:	A relative ranking of the potential for a pesticide to move downward in soil and ultimately contaminate groundwater based upon the persistence and mobility of the pesticide.

RAVE Score Card

The RAVE score card can be completed in a matter of minutes. On a separate sheet of paper write down the appropriate value for each of the nine factors listed on the scorecard. Once all of the factors have been assigned a value, the values should be totaled.

THE RAVE SCORE CARD (Circle one from each category)

<p>Depth to Groundwater: 2-10 ft. <u>20</u> 10-25 ft. <u>12</u> 25-50 ft. <u>5</u> >50 ft. <u>0</u></p>	<p>Annual Precipitation: > 60" <u>5</u> 30-60 " <u>2</u> <30" <u>0</u></p>
<p>Soil Texture: Gravelly <u>15</u> Sandy <u>15</u> Loamy <u>10</u></p>	<p>Pesticide Application Frequency: > 1/year <u>5</u> 1/year <u>2</u> < 1/year <u>1</u></p>
<p>Percent Soil Organic Matter 0-1% <u>5</u> 1-3% <u>3</u> >3% <u>2</u></p>	<p>Pesticide Application Method: Applied to Soil <u>5</u> Applied to Foliage <u>2</u></p>
<p>Topographic Position: Flood Plain <u>15</u> Alluvial Bench <u>10</u> Upland Habitat <u>5</u> Transition zone <u>2</u></p>	<p>Pesticide Leaching Potential (based on pesticide solubility, adsorption coefficient, and half-life) Large <u>20</u> Medium <u>10</u> Small <u>5</u></p>
<p>Distance to Surface Water: 0-100 ft. <u>5</u> 100-500 ft. <u>3</u> >500 ft. <u>2</u></p>	
<p>* If water table is less than 2 feet deep then applications should not be made unless done with a wick applicator or a similar precision applicator.</p>	
<p>Total all rankings for the site and pesticide in question: _____ =RAVE Score</p>	

Interpretation of RAVE Score

Higher numbers indicate high vulnerability of groundwater to contamination by the pesticide used in the evaluation. RAVE scores greater than or equal to 65 indicate a high potential for groundwater contamination. Scores between 45 and 65 indicate a moderate to low potential for groundwater contamination, and scores less than 45 indicate a low potential for groundwater contamination by the pesticide in question. Even in such cases, careful use of pesticides and following label instructions is imperative to protect groundwater.

Note: Some products are used in very small quantities. In cases where less than ½ pound AI per acre is applied, it would be reasonable to reduce the final RAVE score by 2-5 points.

APPENDIX E

Rare and Endangered Plants

Sixteen plants found at the Presidio have been designated as rare, threatened or endangered. These "special status" species are commonly referred to as rare plants. Five of the Presidio's rare plants are protected by the Endangered Species Act, but the Golden Gate National Recreation Area has adopted a policy that ALL rare plants found within its boundaries will be treated as though they have full protection of the Act.

Because of their special status, monitoring of the Presidio's rare plants has been going on for many years. The results of these pioneer efforts have provided valuable baseline information of plant species "on the brink." Park stewards comb the far reaches of the Presidio's remaining natural areas to census and map their populations every one to three years. The resulting data provide a clear picture of shifts in distribution and population size of these special plants.

The following pages contain images of these species, and a map of the locations where these plants have been found.

Federally listed endangered species:

Arctostaphylos hookeri ssp. *Ravenii*
Clarkia franciscana

Federally listed threatened species:

Hesperolinon congestum

Other rare species:

Triphysaria floribunda
Arabis blepharophylla
Chorizanthe cuspidata ssp. *Cuspidate*
Cirsium andrewsii
Collinsia corymbosa
Cordylanthus maritimus ssp. *Palustris*
Erysimum franciscanum
Gilia capitata var. *chamissonis*
Grindelia hirsutula var. *maritime*
Horkelia cuneata ssp. *Sericea*
Silene verecunda ssp. *verecunda*
Triphysaria floribunda

FEDERALLY ENDANGERED SPECIES

Arctostaphylos hookeri ssp. *Ravenii*
Raven's manzanita



Clarkia franciscana
Presidio clarkia



Lessingia germanorum
San Francisco lessingia



Suaeda californica
California sea blite



FEDERALLY THREATENED SPECIES

Hesperolinon congestum
Marin dwarf flax



OTHER RARE SPECIES

Arabis blepharophylla:
Coast rock cress



Chorizanthe cuspidata ssp. *Cuspidata*:
San Francisco spineflower



SF Bay Spineflower Photo: D.L.Smith

Cirsium andrewsii:
Franciscan thistle



Collinsia corymbosa:
Round-headed Chinese house



Cordylanthus maritimus ssp. *Palustris*
Saltmarsh bird's beak



Erysimum franciscanum:
San Francisco wallflower



Gilia capitata var. *chamissonis*
Dune gilia



Grindelia hirsutula var. *maritime*
San Francisco gum plant



Horkelia cuneata ssp. *Sericea*:
Kellogg's horkelia



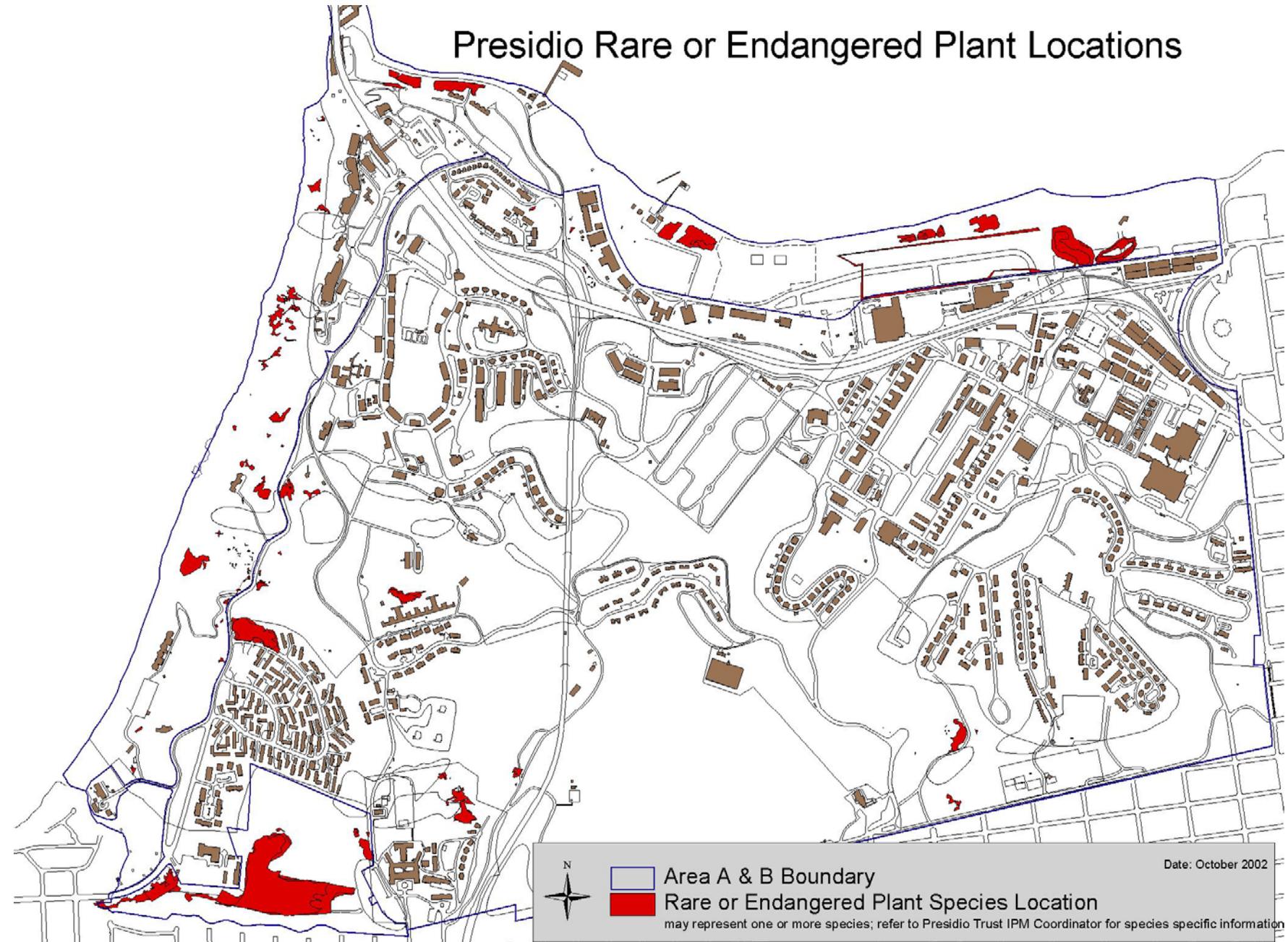
Silene verecunda ssp. *verecunda*
San Dolores campion



Triphysaria floribunda:
San Francisco owl's-clover



Presidio Rare or Endangered Plant Locations



APPENDIX F

PESTICIDE LABELS
&
MATERIAL SAFETY DATA SHEETS