

Integrated Pest Management (IPM)

A Policy of the Recreation & Parks Department



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INTRODUCTION

Urban environments, such as might be found in Santa Rosa, and the various pest organisms that these environments support provide enormous challenge to those individuals, businesses and agencies who attempt to provide for their control. Landscaping, as part of the urban environment, can support additional pest organisms which, at some point, may require the implementation of pest control measures.

There truly is no simple, single approach to the management of any given pest that will provide for reliable long-term control of the pest. Just as the presence or absence of any organism and its periodic population fluctuations are a result of complex interactions, control measures too involve complex analysis involving all aspects of the pest and its surroundings. Part of this equation is the influence of the environment, whether it be at the macro or micro level. The harsh urban environment itself is typically far removed from the necessary balance required to provide stable populations of any organism.

A wealth of information exists regarding the control or management of pest species, most of it quite successful though it may be dependent on any number of factors. Complicating pest management matters considerably, and particularly in the area of landscape pest management, is the absence of any defining criteria regarding at what point a particular pest population becomes a problem. Analysis becomes subjective in nature and usually dependent on attitudes and the personal tolerances of the person(s) affected.

The City of Santa Rosa Recreation and Parks Department has, among others, responsibility for the maintenance of City parks, and various other landscaped areas. Management of various pests are inherent in those responsibilities. Pesticides are one tactic employed by the Department but while pesticides do provide a measure of control against pests, the result can be short lived and can come with unwanted secondary effects.

In order to minimize unnecessary pesticide use and its potential health and environmental effects, the Department has developed this Pest Management Program in order to approach its pest control activities in an integrated manner.

Integrated Pest Management (IPM) is a pest management strategy that focuses on long-term prevention or suppression of pest problems with minimum impact on human health, the environment, and non-target organisms. Preferred pest management techniques include encouraging naturally occurring biological control, using alternate plant species or varieties that resist pests, selecting pesticides with lower toxicities to humans and non-target organisms, adoption of cultural techniques such as proper pruning, fertilization, and irrigation practices that reduce pest problems, or changing the habitat to make it incompatible with pest development. In an integrated pest management program, broad spectrum pesticides are used as a last resort when careful monitoring indicates they are needed according to pre-established guidelines. Implementing an IPM program requires a thorough understanding of pests, their life cycles, environmental requirements and natural enemies as well as the establishment of a regular, systematic program for surveying pests and their damage.

RECREATION AND PARKS DEPARTMENT POLICY			
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1. Purpose

To provide procedural guidelines for the management of various pest species in areas maintained by the Recreation and Parks Department.

2. Definitions

- 2.1 Integrated Pest Management (IPM) is a pest management strategy that focuses on long-term prevention or suppression of pest problems with minimum impact on human health, the environment and non-target organisms. These strategies require the selection, integration and implementation of various pest control techniques considering the various economic, ecological and sociological consequences.

3. Policy

- 3.1 Development of specific pest management practices shall be done utilizing contemporary and applicable IPM research, IPM literature and through consultation with recognized pest management professionals.

Recognizing that pest management is an on-going and evolving discipline, this policy shall be subject to change and other updating modifications as needed to reflect new laws, information, techniques, equipment and materials.

- 3.2 The goals of this policy shall be to:
- 3.2.1 Affect an overall reduction in pesticide usage based on unit area treated.
 - 3.2.2 Provide for the utilization of alternative methods in the control of pests.
 - 3.2.3 Provide for the utilization of Least-toxic pesticides that will provide acceptable control of the pest(s).
 - 3.2.4 Provide for appropriate pre and post-notification of pesticide application in parks and other areas where the public may be affected.

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4. Procedures

4.1 The following recognized Integrated Pest Management techniques shall be employed in providing control of a pest. In the management of a pest, as many of these methods as necessary shall be used.

4.1.1 Education

- Provide pest management information, formally and informally, to maintenance personnel.
- Provide pest management information to affected and concerned residents and facility users.
- Where practical and in specific circumstances, provide pertinent pest management information to the community.

4.1.2 Monitoring

- Establish threshold action levels for pest damage, injury or nuisance.
- Identify pest species and track population levels.
- Identify beneficial species and track population levels.

4.1.3 Physical

- Barriers to exclude entry or introduction of pest.
- Continued use of mulching materials.
- Design considerations that minimize potential pest problems.
- Hand removal of pests as is done with snails at Burbank Home and Gardens through the effort of volunteers.
- Removal of diseased and insect infested plant parts.

4.1.4 Mechanical

- Use of discs, weed mowers, string weed trimmers, hoes and hand pulling of weeds.

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4.1.5 Cultural

- Providing conditions conducive to healthy plant growth.
- Sanitation through removal of plant debris that harbors insects and plant pathogens.
- Modification of the environment to disrupt the pest cycle such as in alteration of irrigation times, frequency, amount and adjustments to mowing heights of turf.
- Provide conditions that allow for increase in populations of beneficial organisms.

4.1.6 Biological

- Maintaining existing populations of beneficial organisms.
- Supplementation of beneficial populations through releases.
- Use of Abiological@ or non-chemical pesticides.

4.1.7 Plant Selection

- Selection of plant materials suited to the site.
- Selection of resistant plant materials.
- Systematic removal of problem plants and replacement with appropriate plant species.

4.1.8 Chemical

- Use of Abio-rational@ pesticides (typically those which are derived from plants which have pesticidal properties).
- Use of Aleast-toxic@ pesticides.
- Selection and use of traditional pesticides that provide acceptable control with consideration given to human health and environmental effects.

PEST MANAGEMENT STRATEGIES

(Definitions)

The following information was used in the development of pest control strategies for the various pest that affect areas for which the Recreation and Parks Department has responsibility.

A. The Pest

The various insect, plant, disease and animal pests have been identified in general terms. The common names of pests are used though in some cases the scientific name could be used for purposes of clarification. As an example, identifying the aphid pest of tuliptrees as the >tuliptree aphid= is preferable than simply identifying it as aphid.

B. The Location

The various locations have been identified generically to accommodate the wide variety of situations for which the Department has responsibility.

C. The Host

The host is the site, plant (or animal) on which the pest lives. An example would be in the case of the tuliptree. The tree is the host, the tuliptree aphid is the pest,

D. Action Threshold

An action threshold is an observable condition or set of conditions that must be present before a pest control method can be initiated. Action thresholds are calculated to initiate a specific pest control method(s) when it will be effective in keeping the pest population below an injury level.

A pest is only a problem if it causes significant damage or nuisance effect. An insect that eats only one leaf from a tree is not a problem but if it ate 50% of the leaves it might be considered a problem. The amount of damage or nuisance affect that a pest must cause before it is considered a problem is the injury level. The injury level is then used to determine the action threshold. The action threshold should take into account the pest=s natural population fluctuations, natural enemies, time needed for control measures to take effect, etc.. In the development of these action thresholds, IPM literature, staff experience, recognized pest management professional as well as other various resources have been consulted.

The action thresholds illustrated in the various Management Plans in this program differentiate between non-chemical and chemical control methods. Non-chemical control methods are preferred because they have few if any adverse effects and should be implemented before chemical control controls with potentially adverse effects are implemented.

Typical action thresholds found in this program include;

- Observing the pest in a specified abundance.
- Observing a specified amount of pest damage.
- Observing specific environmental conditions favorable pest environment.

E. Methods of Control

The following categories represent widely accepted components utilized for the control of pests using an IPM approach and have been utilized in the development of action plans found in the Pest Management Plans.

There are overlaps between these categories and they can be broken down further but as presented below they represent the major control method components. Below each are particular practices of tactics that illustrate the intent of the category. This list is by no means complete, they simply serve as illustration.

It is important to realize that in many cases no single approach will be effective in the control of a pest, rather it is the combination or @integration@ of these methods for the purpose of successful ecosystem management that will provide long term control. Further, it should be understood that not all methods are effective against all pests nor should they be expected to be effective against all life stages of a particular pest.

Many control tactics should be developed and creativity is encouraged. This helps keep potentially adverse effects from accumulating and the pest from possibly developing resistance to a particular form of control. It also gives a number of options to best meet any particular situation. All potential methods should be considered.

The various management tactics outlined in the Pest Management Plans come from a variety of sources including pest management literature, pest management professionals and staff experience. As listed, they are the potential tactics that may be employed in the management of a pest. Though each tactic is a viable method to aid in the management of a pest, it should not be expected that every tactic will be successful at every site and in every situation.

1. Design Considerations

Prevention is the single most important component of landscape IPM. Recognizing the potential for future pest problems when designing or modifying a site can minimize and even eliminate many pest problems. Those design considerations include;

- Proper site preparation.
- Properly designed irrigation system.
- Selection of plant materials suited to the site and climate.
- Selection of plant materials with pest tolerance or resistance.
- Use of hard surfaces to eliminate weed problems.
- Use of densely growing plants that will choke out weed growth.

2. Biological Control

This entails the use of beneficial organisms in the control of pests. It is important to realize that other pest management activities, most notably the use of pesticides, can have an adverse effect on beneficial organisms. Practical implementation would consider;

- Maintenance of existing populations of beneficial organisms.
- Supplementation of beneficial species.
- Encouraging plant diversity to provide food and habitat for beneficial species.
- Avoidance of pesticide use, particularly broad spectrum insecticides and fungicides.

3. Cultural Control

Cultural control tactics are horticultural practices that provide for optimum plant health. These include;

- Providing water in the proper manner, amount, frequency and time.
- Insuring proper soil fertility, avoiding nutrient deficiencies and excesses.
- Use of proper pruning techniques and pruning at the proper time.
- Proper mowing heights.
- Insuring proper sanitation practices.

4. Mechanical Controls

Mechanical methods generally utilize labor, materials not considered pesticides and machinery to control pest levels. Examples would include;

- Hand removal of weeds and other pests.
- Use of mulch materials
- Use of hand or power tools such as hoes, mowers, string weed trimmers.
- Removal of infested plants or plant parts.
- Use of traps.

5. Physical Controls

These controls are those activities that manipulate the environment and are quite successful in closed environments such as greenhouses. In the landscape these tactics could include;

- Thinning of a tree or shrub to improve air circulation in the canopy.
- Thinning of canopies to increase temperatures for insect control.
- Whitewashing trunks of young trees to prevent sunscald.
- Covering of cold sensitive plants in winter to increase temperatures.
- Utilizing sun and/or shade for temperature control.

6. Chemical Controls

Chemical controls employ pesticides in the management of pests. Tactics include;

- Use of least toxic pesticides.
- Use of lower-than-label rates of pesticides.
- Insuring proper timing of pesticide application.
- Spot treatments.
- Staggering of treatments.

F. Monitoring

Monitoring is an information gathering and record keeping activity that is the basis of any successful IPM program. Monitoring utilizes a variety of techniques ranging from casual observation to statistically valid quantitative sampling, to measure pest damage, track populations of both beneficial and pest organisms and provide assessment of the site and surroundings.

Careful, concise records are necessary to determine when specific control tactics are to be implemented to keep pest levels below the injury level. This information is further utilized to measure the effectiveness of specific tactics, to pinpoint Ahot spots and used in subsequent years for planning and timing of control activities.

A variety of monitoring methods will be utilized by the Department and will be dependent on the site and pest being monitored.

PEST MANAGEMENT PROCEDURES

A. Pest Management Request

All requests for pest control assistance shall be forwarded to the Pest Control Supervisor in writing for the purposes of documentation.

1. Requests from Recreation and Parks staff shall be in the form of a Work Order.
2. Complaints involving street trees shall be in the form of a Work Order.
3. Requests from other departments may be in the form of that departments Work Order, a Request for Service or by E-mail.

A. Site Assessment/Monitoring

Upon receipt of a request, the Pest Management Supervisor will inspect the site and surroundings and perform an assessment noting;

1. Presence/absence of pest and at what levels.
2. Presence/absence of beneficial insects and at what levels.
3. Site conditions, particularly those that may be contributory to the pest problem or that can be utilized in a solution.
4. Recent weather conditions of forecasts that could be contributory to the problem or utilized as part of a solution.

Once the site assessment has been completed, a discussion will take place with the affected party and an appropriate course of action will begin. Where a management plan for the pests exists, it will provide the guidelines to be followed. In the event a management does not exist, one is to be developed to provide proper direction for control of the pest. When a pest problem exists, the above steps will initiate the monitoring process.

A. Implementation of Control Measures

Regardless of the pest population or associated threshold level, a non-chemical control approach will always be considered first even when populations are at levels that chemical controls could be considered.

1. Non-chemical control

In most cases, the various management plans in this program outline multiple non-chemical pest control methods. These methods are to be enacted first. Instructions and any necessary training regarding implementation of these tactics will be provided to the responsible person/crew. Follow-up inspections will take place at specific intervals or pre-determined times to evaluate control.

2. Chemical Control - Pest Control Recommendation

Any time that a chemical control measure is warranted and regardless of threshold levels, a least-toxic pesticide will always be considered first. Follow-up inspections will take place at specific intervals or pre-determined times to evaluate control.

For any chemical control measures that take place in parks, median strips, other rights-of-way and any other area that is considered agricultural use by the State of California, a Pest Control Recommendation written by the Pest Control Supervisor or other licensed Pest Control Advisor is required.

All employees applying pesticides shall always remember the following;

- Follow product label instructions at all times.
- Confine sprays to the site being treated, do not allow drift.
- Treat only the targeted pest.
- Treat only the smallest area necessary.
- When applying insecticides to large areas or many plants, staggered treatments on smaller areas minimize impacts to beneficials.

3. Public Notification

To ensure that the public and City staff are aware that pesticides are to be used in parks, public building landscapes, surplus properties, any of the following methods or combinations of are to be utilized;

- signs
- isolation, in combination with signs
- blue indicator dye in spray mix
- media sources/neighborhood notification

4. Record Keeping

Records of pesticide use shall be kept by all persons applying pesticides.

These records are to include;

- date and time of application
- brand name of the pesticide
- target pest(s)
- amount of pesticide used
- name (or initials) of applicator
- where application was made (location, host, specific site within a park, etc.)

These records shall be forwarded to the Pest Management Supervisor no later than the third working day of the month following application. By

law, this information is to be provided in summary form to the Sonoma County Agricultural Commissioners Office.

GENERAL PROCEDURES

A. Laws, rules and regulations

All Federal, State, and County laws, rules and regulations pertaining to the handling and use of pesticides will be followed.

B. Pesticide procurement

Pesticide acquisition shall be done only by the Park Maintenance Superintendent, Pest Management Supervisor or the Senior Maintenance Workers assigned to pest control activities.

B. Pesticides and pesticide container disposal

1. Every effort shall be made to mix only that amount of pesticide necessary to complete an application(s).
2. Unused pesticides shall be lawfully disposed of at a site that is licensed to accept such wastes.
3. All empty pesticide containers shall be rendered clean according to regulations prior to disposal at a site approved by the Sonoma County Agricultural Commissioners Office. The rinsate from rinsing procedures shall be added to the spray tank as part of the mixture. At such time as sufficient and appropriate storage space can be located, liquid pesticide containers shall be lawfully stored pending disposal at a regional container recycling event.

D. Applicator training

All personnel involved in pesticide handling and application activities will have the following training as required by law;

1. Annual training on the safe and proper handling of pesticides.
2. Each employee that handles pesticides shall be trained annually on the proper use of each pesticide prior to its use.
3. Continuing education is required by law for all Pest Control Advisors and Qualified Applicators in order to keep their licenses and certificates current. This education is in the areas of laws and regulations and pest control methods and is offered through seminars approved by the State Department of Pesticide Regulation.

E. Maintenance Staff training

The success of any IPM program is dependent on the skills and knowledge of those involved with its implementation. Information and training is to be provided for all maintenance staff and will include;

1. Principles and components of IPM.

2. Management strategies regarding pests common to all areas.
3. Management strategies regarding pests specific to specific areas.
4. Non-chemical pest control techniques.

F. Public Education

When requested from the general public, the following information will be given;

1. IPM concepts and components.
2. Integrated solutions to pest problems, if known.
3. Other contacts/agencies/resources that might be able to assist the individual.
4. Information regarding the departmental IPM program.

G. Reports

1. Monthly Report
The Pest Management Supervisor will prepare a monthly summary report of all pesticides used. This is to be sent to the Sonoma County Agricultural Commissioners Office by the 10th of the month following application as required by law.
2. Yearly Report
The Pest Management Supervisor will use the monthly reports to prepare an annual report for the Recreation and Parks Director. This report will include:
 - detailed pesticide usage data.
 - how usage compared with target reduction of 50%.
 - discussions of methods being used to reduce pesticide usage.
 - any revisions or other updating of this program.

H. Research

The City of Santa Rosa and its employees are not permitted to conduct research involving the use of pesticides for the purposes of field trials and data collection by pesticide manufacturers or those companies and individuals promoting pesticidal properties of products not registered by the EPA, nor would the Recreation and Parks Department wish to involve itself in these types of endeavors. Realizing however, that much needs to be learned in the area of pest management, particularly in the urban environment and especially with respect to our own problems, the department may assist University, Extension and County Agricultural personnel in research involving;

1. Biology, habits and life cycles of pests.
2. Non-chemical methods of pest management.
3. Other projects that would further development of sound IPM practices.
Requests for assistance will be reviewed on a case-by-case basis considering City liability, potential hazards to the public, potential damage to City property, time commitments and constraints that would be placed on City staff and facilities as well as any other considerations that might

arise.

I. Contractors

All contractors performing work for the Recreation and Parks Department will be required to follow notification guidelines with regards to sign posting and will be encouraged to follow sound IPM practices. This requirement applies to all new contracts the Department enters into.

PUBLIC NOTIFICATION

The following methods are to be used when notifying people of when and where pesticides have been or plan to be used.

A. Signs

When pesticides are scheduled to be used in a park, surplus property or pathway, a public building landscape and certain landscaped islands, notification signs shall be posted.

The intent of posting is to provide sufficient warning to individuals that a pesticide application is planned or has recently occurred. This must be remembered when posting since each site has unique qualities that will affect sign locations. Particularly where entries to a site or location within a site are not limited to specific gates, walkways, etc.

NOTE: It is permissible to use the small yellow Pesticide Application flags to further identify where pesticides have been applied. They are to be used in conjunction with, not as a replacement for, the signs.

1. Specifications

The signs shall be;

- 11" x 14" in dimension (except at Burbank Home & Gardens, Courthouse Square, Railroad Square and public building landscapes where the signs will be 11" x 8 2" in dimension).
- Be printed in red and black lettering on a white background
- Be printed in English and Spanish.
- Include the following information;
 - Date and time of planned application
 - Location within the site to be treated (where blue dye will be used, note of it to be made here).
 - The pest(s).
 - The pesticide(s) used.
 - Warning to stay out of treated areas for a specific time.
 - A departmental phone number to call for more information.

2. Posting duration

Signs shall be posted a minimum of 48 hours prior to the start of the pesticide application and will remain posted for a minimum of 48 hours after the application unless the pesticide label specifies a longer interval. (Burbank Home & Gardens shall be posted immediately prior to an application).

3. Posting locations

Posting locations will be dictated by the site or particular area within a site. It is recognized that not every sign placed will remain for the full posting duration. However, it is the responsibility of the applicator to insure that a site is fully posted before leaving the site after an application.

PARKS, SQUARES, BURBANK HOME & GARDENS, PUBLIC BUILDINGS - signs shall be posted at all sidewalks and paths that normally enter the site or treated area within the site, at any other location where people would normally enter the site or treated area and any other logical location that would provide adequate warning to people entering the site or treated area.

SURPLUS PROPERTIES - signs shall be located on each side of the property and any other logical location that would provide adequate warning to people entering the site or treated area.

TRAILS/PATHWAYS - signs shall be located at each end of the pathway and at any other entrances to the path.

LANDSCAPED MEDIANS - In residential neighborhoods, signs will be placed around the site.

Certain facilities such as Doyle Park Ballfield can be locked to preclude unwanted entrance. Where this is possible, notification signs do not need to be posted in advance but will be posted upon completion of the application.

Residential street trees will not be chemically treated without prior knowledge and consent of the resident. In the event that a pesticide is injected into the tree or soil, posting is not required as long as the applicators remain on site throughout the duration of the operation.

Consult with the Pest Management Supervisor when questions arise.

B. Isolation

When circumstances warrant, treated areas will be barricaded to restrict entry. This barricading may be in the form of physical barricades, warning tape or temporary fencing. This isolation shall always be done in combination with signs.

C. Blue indicator dye

When possible, blue dye will be added to the pesticide mixture to indicate where pesticides have been applied. Not all situations lend themselves to the use of indicator dyes. Some pesticides have their own inherent coloring and these indicator dyes do not show up. With some types of application equipment, most notably controlled droplet applicators, dyes do not show when used according to the label.

D. Media sources and/or Neighborhood notification

In some situations it may be necessary to notify the residents in a neighborhood of a planned pesticide application. In some cases the use of the local media through press releases may also be utilize

PEST MANAGEMENT PLANS

VEGETATION MANAGEMENT

The majority of pest management efforts performed by the Recreation and Parks Department are in the control of weeds and other unwanted vegetation in various areas of responsibility for the purposes of aesthetics, fire prevention, pedestrian and vehicular safety and to reduce plant competition.

AESTHETICS - Uncontrolled weed growth throughout the city in general and in the parks, traffic medians and other landscapes in particular lead to an unkempt appearance.

FIRE PREVENTION - Because of the relatively high annual rainfall, the large number of vegetative species and the hilly terrain that is found in Santa Rosa, fire prevention is of great concern.

VISUAL SAFETY - Uncontrolled weed growth can interfere with visibility along our streets and create unsafe situations for pedestrians, cyclists and motorists.

COMPETITION - Those plants commonly referred to as weeds are well known for their ability to adapt to a variety of environments and out-compete landscape plants for water and nutrients. In order for landscape plant materials to become established, weed control efforts are necessary.

**VEGETATION MANAGEMENT
ACTION PLAN**

General Landscaped Areas

LOCATION	ACTION THRESHOLD	ACTION
All areas of departmental responsibility.	Weeds covering 10% or less of the ground where not desired.	Mechanically remove. Use weed burner. Where possible, add mulch to a minimum depth of 4 inches. Consider use of densely growing plant materials.
	Weeds cover more than 10% of the ground where not desired.	Any of the above non-chemical tactics. Spot treat with appropriate herbicide.
	Weeds cover 5% or less of the ground in planter beds.	Mechanically remove. Use weed burner. Where possible, add mulch to a minimum depth of 4 inches. Consider use of densely growing plant materials.
	Weeds cover more than 5% of the ground in planter beds.	Any of the above non-chemical tactics. Spot treat with appropriate herbicide.
	Any area historically requiring weed control measures.	Possible spring and/or fall application of pre-emergent herbicide.

**VEGETATION MANAGEMENT
ACTION PLAN**

Turf Areas

LOCATION	ACTION THRESHOLD	ACTION
All turf areas.	Broadleaf or grassy weeds cover less than 20% of the turf area.	Observe proper mower sanitation. Remove mechanically. Re-evaluate cultural practices, test soil fertility.
	Broadleaf or grassy weeds cover 20% or more of the turf area.	Any of the above tactics. Spot treat with appropriate herbicide.
Turf edges that can be edged with power edger..	Any time edging is necessary.	Use power edger.
Turf edges that cannot be edged with power edger.	Turf growing up to 3 inches over pavement edge.	Remove mechanically. Use weed burner.
	Turf growing more than 3 inches over pavement edge.	Any of the above tactics. Spot treat with appropriate herbicide.
Turf irrigation heads	Turf growing around head causing water to pond or other disruption of proper operation.	Mechanically remove . Vertical mow to remove built-up thatch. Raise head in extreme case.

**VEGETATION MANAGEMENT
ACTION PLAN**

Athletic Fields

LOCATION	ACTION THRESHOLD	ACTION
All areas of departmental responsibility.	Winter weed removal for pre-season preparation of baseball and softball fields.	Mechanically remove weed growth with field drags. Spot treat with appropriate herbicide.
	Turf encroached up to 12 inches into bare areas of ballfields.	Mechanically remove. Use weed burner.
	Turf encroached 12 inches or more into bare areas of ballfields.	Any of above tactics. Spot treat with appropriate herbicide.
	30% of field lines have unwanted regrowth.	Mechanically remove. Spot treat with appropriate herbicide.

Miscellaneous Areas

LOCATION	ACTION THRESHOLD	ACTION
Asphalt or concrete roads, pathways or other paving and hard surfaces.	Weeds growing in joints or cracks.	<ul style="list-style-type: none"> • Mechanically remove. • Use weed burner. • Any of above tactics. • Spot treat with appropriate herbicide.
Surplus properties, roadsides, pathways, other R-O-W sites such as fire hydrants traffic signal control boxes.	Weeds & other unwanted vegetation cover less than 25% of the area.	Mechanically remove. If possible, add mulch to a minimum depth of 4 inches.
	Weeds & other unwanted vegetation cover 25% or more of the area.	Any of above tactics. Treat with appropriate herbicide.

**VEGETATION MANAGEMENT
ACTION PLAN**

Traffic Medians

LOCATION	ACTION THRESHOLD	ACTION
All traffic medians.	Weeds cover 5% or less of the surface of landscaped median.	Mechanically remove. Use weed burner. Add mulch to a minimum depth of 4 inches. Consider use of densely growing plant materials.
	Weeds cover more than 5% of the surface of landscaped median.	Any of above tactics. Treat with appropriate herbicide.
	Weeds cover 10% or less of the surface of non-landscaped median.	Mechanically remove. Use weed burner. Add mulch to a minimum depth of 4 inches. Consider use of densely growing plant materials.
	Weeds cover more than 10% of the surface of non-landscaped median.	Any of above tactics. Treat with appropriate herbicide
	Weeds in the concrete cracks/joints of any median cover less than 5% of the area or are less than 6 inches in height.	Mechanically remove. Use weed burner.
	Weeds in the concrete cracks/joints of any median cover 5% or more of the area or are 6 inches or more in height.	Any of above tactics. Treat with appropriate herbicide.

**VEGETATION MANAGEMENT
ACTION PLAN**

Poison Oak - Blackberries - Unwanted trees/shrubs

LOCATION	ACTION THRESHOLD	ACTION	
All areas of departmental responsibility.	Poison oak growing in any area with potential for contact.	Remove mechanically.	
	Blackberry thicket to be partially or fully removed.	Treat regrowth with appropriate herbicide.	
	Blackberries growing in landscaped area.	Treat regrowth with appropriate herbicide.	
	NOTE: When chemical treatments of blackberries is warranted, non-fruiting canes may be treated at any time. Any stands containing fruiting canes can only be treated after all fruit has dried.		
	Unwanted weed species; tree or shrub.		Remove mechanically.
			Treat regrowth with appropriate herbicide.
		Remove and stump treat with appropriate herbicide.	

Aquatic Weeds

LOCATION	ACTION THRESHOLD	ACTION
Howarth Park/Lake Ralphine.	Eurasian watermilfoil growing to within 18 inches of water surface.	Treat with appropriate herbicide per Fish & Game permit. Explore viable means of biological and mechanical control methods.
Select areas identified on Fish & Game permit.	Weed growth restricts summer flows encouraging siltation, mosquito habitat and increases chance of winter flooding.	Evaluate site for modifications. Mechanically remove. Treat with appropriate herbicide per Fish & Game permit.

INSECT PEST MANAGEMENT

Insect pest management involves controlling damaging insects as well as those causing nuisance problems. These pests can cause significant flower and foliar damage, physically weaken plants, spread disease and provide opportunities for disease and other insects to invade plants. Control is achieved through a variety of methods.

While the vast majority of the landscape plants in this area suffer from insect infestation at some time or other, the typical insect pest problems that are found in the landscapes maintained by the Recreation and Parks Department generally involve only a few insect pests and a handful of plant species. This is true for the trees and landscaping that are maintained by the Department. Whether this is fully attributable to beneficial insect diversity or because the plants that remain are those that suffer fewer insect pest problems and/or can tolerate higher insect populations is not known.

Mechanically, pests and/or infested plant parts should be removed by hand when possible. Removal of Abroad wood@ is effective in controlling certain insect species. Periodic, high pressure water washes can be used when insect populations are low.

Culturally, maintenance of plant health is of great importance in insect pest control. Properly cared for plants are less stressed and therefore less susceptible to insect (and disease) attack. Along the same lines, plant materials should be selected with care, matching species to conditions present at the site.

Biologically, beneficial insects provide the single greatest effort in controlling plant pests. This is why we have few insect pest outbreaks many of which require no attention on our part. Maintenance of beneficial insects is the key to controlling pest problems. This is accomplished by judicious use of pesticides and encouraging additional habitat.

Chemicals are used in the control of plant damaging pests and, where effective alternative control methods exist, pesticides are used as a last resort. Those pesticides that are Reduced risk@ are to be considered first. The use of attractants in conjunction with traps can be used though this approach is most effective in dealing with specific pests and best used when monitoring pest levels.

PLANT DISEASE MANAGEMENT

With few exceptions plant diseases do not constitute a severe enough problem to require extensive control efforts on our part. Leaf blights caused by anthracnose, powdery mildew and entomosporium leaf spot can occur on several of our tree and shrub species and can at times cause severe and repeated defoliation.

As with many plant diseases, these three problems are weather dependent. That is, they spread during specific weather conditions. When weather conditions change, the disease subsides and the problem resolves itself. While control can be achieved chemically, it would typically require many repeat applications during these specific weather conditions. Because of these factors we have adopted a non-chemical approach in dealing with these diseases.

TREES

The vast majority of the trees the City maintains are street trees. It must be understood that these trees are located in a very stressful situation; surrounded by concrete and asphalt, exposed to the effects of vehicle exhaust, susceptible to vandalism and generally not properly cared for by the property owners. Because of these stresses, street trees generally have greater susceptibilities to insect (and disease) problems. Trees growing in the parks and other landscapes are typically less stressed and consequently have fewer insect problems and at levels that can be tolerated.

Problems in street trees are usually brought to our attention by residents and City staff though some trees are monitored by departmental staff. Upon a complaint, the tree(s) is inspected by the Pest Management Supervisor. Other trees of the same species in the immediate area should be inspected as well to determine the extent and severity of the problem. In addition to the immediate concern, the trees should be looked at in terms of overall health and inspected for beneficial insects. Discussion with the resident then takes place to gain a greater understanding of the problem, what measures can be implemented including those that can be initiated by the resident.

When chemical treatments are warranted only those trees in question are to be treated and only with the knowledge and permission of the effected residents. While solicitation of insecticidal treatments is strongly discouraged, in extremely rare circumstances under specific situations it can be used to reduce a call back to the same site. When many trees are to be treated along a residential block, treatments are to be staggered to minimize impacts on non-target organisms including beneficial insects.

In truth, insect infestations warranting the use of insecticides are few and typically occur on a few species of trees most of which are we no longer plant. Discussions regarding systematic removals of these trees is on-going. Meanwhile we continue to look into other materials and application techniques which can reduce usage, exposure and minimize environmental impacts.

**INSECT PEST MANAGEMENT
ACTION PLAN**

LOCATION	ACTION THRESHOLD	ACTION
All City maintained trees and landscape plants.	APHIDS: Less than 10 aphid of any growth stage found on any 10 leaves OR less than 10 aphid found on the terminal 6 inches of growth on any 10 terminals OR foliar distortion visible on less than 20% of foliage.	Address cultural needs, avoid high nitrogen levels. Prune out infested areas. Use high pressure water wash. Control ants where present. Use A reduced-risk@ insecticide (neem, soaps, oils).
	APHIDS: 10 aphid of any growth stage found on any 10 leaves OR 10 or more aphid found on the terminal 6 inches of growth on any 10 terminals OR foliar distortion visible on 20% or more of foliage OR any honeydew present on pavement, vehicles, Astreet furniture@, OR yellowjackets observed feeding on honeydew .	Any of above tactics. Treat with insecticide.
	SCALE: Scale visible on less than 20% of plants branches.	Address cultural needs. Control ants where present. Prune out infested areas.
	SCALE: Scale visible on 20% or more of plants branches.	Any of above tactics. Treat with insecticide.

**INSECT PEST MANAGEMENT
ACTION PLAN**

LOCATION	ACTION THRESHOLD	ACTION
All City maintained trees and landscape plants.	MITES: Mite damage visible on less than 25% of foliage.	Address cultural needs, avoid high nitrogen levels. Address site conditions that promote population build-ups. Use high pressure water wash.
	MITES: Mite damage visible on 25% or more of foliage.	Any of above tactics. Treat with miticide.
	WHITEFLY: Whitefly of any growth stage present on less than 10% of foliage.	Address cultural needs, avoid high nitrogen levels. Control ants where present. Prune out infested areas.
	WHITEFLY: Whitefly of any growth stage present 10% or more of foliage.	Any of above tactics. Treat with insecticide.
	CATERPILLARS:Lepidopteran larvae causing damage to less than 10% of foliage.	Remove pests/prune out infested areas. Treat with B.t. if 1 st or 2 nd instar.
	CATERPILLARS:Lepidopteran larvae causing damage to 10% or more of foliage.	Any of above tactics. Spot treat with insecticide.

**INSECT PEST MANAGEMENT
ACTION PLAN**

LOCATION	ACTION THRESHOLD	ACTION
<p>All City maintained trees and landscape plants.</p>	<p>BORERS: Signs of boring insects apparent.</p>	<p>Address cultural needs.</p> <p>Prune to remove infested wood.</p> <p>Routine pruning only when adult borers are not present.</p> <p>Remove Abrood wood@ or those plants with sufficient infestation that threaten other plants.</p> <p>Select proper replacement plant species.</p>
	<p>BRONZE BIRCH BORER: Birch tree shows sign of this insect.</p> <p>NOTE: Santa Rosa area is only location in California where this potentially devastating pest is known to occur. Special precautions necessary for control.</p>	<p>Provide proper cultural needs, specifically water needs.</p> <p>Remove infested wood. Pruning to be done during dormant season only.</p> <p>Remove Abrood trees@, unhealthy trees showing 25% or more dieback regardless of cause.</p> <p>Destroy all wood suspected of being infested with this pest by chipping, grinding, burial or complete tarping for a one year period.</p> <p>NOTE: City no longer plants birch trees and recommends against planting of any birch species in Sonoma County.</p>

**INSECT PEST MANAGEMENT
ACTION PLAN**

LOCATION	ACTION THRESHOLD	ACTION
All City maintained Locust, Honeylocust and Ash trees.	LEAFHOPPER/PLANTBUG: (may exist singly or in combination) Trees show 20% or greater defoliation.	Use high pressure water wash. Treat with insecticide.
All City maintained Maples of any species.	BOX ELDER BUG: infestation of any size.	Address site sanitation; debris removal. Destroy eggs - check structures, foliage. Treat all stages with insecticide at any time. Timing sprays related to egg hatch is critical.
All City maintained Elm and Zelkova species.	ELM LEAF BEETLE: Less than 10% of foliage showing feeding damage.	Address sanitation; debris removal. Treat with B.t. if 1 st or 2 nd instar. Use sticky material to trap larva.
	ELM LEAF BEETLE: 10% or more of foliage showing feeding damage.	Any of above tactics. Treat with insecticide.

VERTEBRATE PESTS

Rats & Mice

Though typically viewed as being quite similar there are considerable physiological and behavioral differences between rats and mice. Generally speaking, mice are found indoors while rats are found outdoors. While a mouse will make its presence known through noise or droppings, the presence of rats is sometimes harder to determine. If a rat is seen indoors or outside in the daytime it can be safely assumed there is a large rat population.

LOCATION	ACTION THRESHOLD	ACTION
All areas of departmental responsibility.	Evidence of mice are observed or one has been seen.	Eliminate entry sites. Eliminate food sources, provide proper sanitation. Safely set traps in areas of activity. Safely set bait stations in areas of activity.
	Evidence of rats are observed or one has been seen.	Eliminate entry sites. Eliminate food sources, provide proper sanitation. Evaluate habitat for modification or removal. Safely set traps in areas of activity. Safely set bait stations in areas of activity.

Gophers & Moles

Though quite difference in appearance, diet and behavior, most people cannot differentiate the mounds caused by a gopher from those of a mole. Though beneficial in the sense that they aerate and turn the soil, both animals can be damaging to the landscape and, in the case of gophers, create holes that are tripping hazards. Oftentimes these holes are enlarged by dogs.

LOCATION	ACTION THRESHOLD	ACTION
All areas of departmental responsibility.	Evidence of mole is observed.	Physically remove mole. Trap; to be set only where it can be done safely.
	Any gopher population.	Flood burrow system where possible. Trap.
	1 gopher mound in any turf area or annual planting bed OR 10 mounds in any 1000 square feet of planted areas OR 20 mounds in any 1000 square feet of non-planted areas.	Any of above tactics. Bait. Provide control of broadleaf weeds if in turf.

Tree & Ground Squirrels

As indicated by their names these animals occupy quite different habitats. While the tree squirrel is usually no more than an entertaining animal it can injure people and can cause considerable damage and even death to plants with some of its feeding habits. Tree squirrels are protected by law and any control methods outside of exclusion or use of repellants must be approved by State Fish & Game.

Ground squirrels are common in this area and there are colonies in some of our parks though they are seldom noticed. While ground squirrels rarely if ever cause problems in the areas they presently occupy, their nest holes can get quite large and in that respect they have the potential to be a trip hazard. Given their present proximity to the Lake Ralphine dam at Howarth Park it is quite possible they could begin burrowing into it with potential for catastrophic results.

LOCATION	ACTION THRESHOLD	ACTION
All areas of departmental responsibility.	Any damage by tree squirrel to any structure or plant of value.	Use repellants where possible. Use exclusionary control where possible. Trap with permit from Fish & Game.
	Any ground squirrel burrow entrance that is a hazard.	Fill in burrow entrance. Bait; stations to be safely set.
	Any ground squirrel burrowing within 50 feet of the base of dam at Lake Ralphine.	Bait; stations to be safely set.

MISCELLANEOUS AND NUISANCE PESTS

Bees

Bees are a beneficial insect of immeasurable value because of their pollination efforts. Bees in general are not viewed by the department as threatening though bee stings are painful and cause extreme allergic reaction in some people. Management activities are designed to eliminate plant materials that are attractive to bees.

Where possible, every effort should be made to preserve bee populations both in physical activities as well as in the selection and use of pesticides. Occasionally situations arise when the removal or destruction of a hive is necessary.

Wasps, hornets, yellowjackets

This group of stinging insects are collectively known as wasps. Most of these species are beneficial in they are predatory on soft-bodied insects and are best known for their aggressive, unwanted behavior. Their stings are painful and can cause extreme allergic reaction.

Digger bees (digger wasps, sand wasps)

This is an interesting insect closely related to the wasp group. They are found in large colonies in most of the sand play areas in our parks. This beneficial insect looks and behaves somewhat like a yellowjacket and can be a cause for alarm. Though fully capable of stinging, this insect is not aggressive and is no cause for concern.

Spiders

Spiders are perhaps the most maligned and least understood of the animals found in the environment. Most people have some degree of aversion to spiders though they are extremely beneficial in their control of flies and other small insects. This area is home to large number of spider species found in a variety of habitats. The black widow spider, found in large numbers in this area, is also beneficial though its bite is painful and can be fatal.

Because of most peoples dislike of spiders, some degree of control is generally desired. With the exception of black widow spiders chemical control is rarely warranted.

Ants

While it might be hard to get many people to agree, ants should be viewed as a beneficial species in the sense of the role they play in the environment. It is when ants get into homes and other structures that people experience the nuisance side of their behavior. Ant invasions into irrigation controllers is the single largest problem with ants experienced by the department.

Fleas

While reports of fleas in the parks or other recreational areas is not common, the potential

for flea problems must be anticipated given the numerous dog areas and the possibilities for more in the future.

Birds

Though birds generally are not much of a problem, some species have on occasion become severe enough of a problem to warrant some type of action. The pigeon for example, is one species of bird that has adapted quite well to the urban environment. They are notoriously filthy and are capable of transmitting some extremely serious diseases to humans.

There are only a few control methods available that can be utilized for birds and even fewer in urban settings. While some methods work well with some species, they cannot be counted on to work for all species.

LOCATION	ACTION THRESHOLD	ACTION
All areas of departmental responsibility.	BEES: tree containing a bee hive requires pruning, removal or other work that would disrupt hive.	Have beekeeper remove. If possible, remove section of tree containing hive and offer to beekeeper. Treat with an insecticide.
	BEES: A swarm of bees is observed on a plant, structure, etc.	Have beekeeper remove.
	WASPS: wasp, hornet or yellowjacket nest is found anywhere that is potentially threatening to patrons.	Physically remove or destroy nest. Treat nest with insecticide.
	SPIDERS: found in/on buildings.	Use broom, vacuum or water to remove spider and webbing.
	SPIDERS: Black widow is found and is threat to staff or patron.	Use above tactic. Physically kill spider. Use acaricide. Seal area if possible to prevent future infestation.

LOCATION	ACTION THRESHOLD	ACTION
All areas of departmental responsibility.	DIGGER BEES: Observed in play areas or other sandy areas.	Rake to discourage nesting.
	ANTS: observed inside structures, irrigation controllers, electrical cabinets, etc.	Seal routes of entry where possible. Provide proper sanitation, properly store foodstuffs. Use Asticky@ barriers. Use properly placed bait stations. Use insecticide. On outside of inhabited structures only.
	FLEAS: reported in designated dog areas.	Yearly application of Steinernema carpocapsae nematode. Remind users of importance of proper dog grooming.
	FLEAS: reported in other areas.	Determine extent of infestation. Apply Steinernema carpocapsae nematode.
	BIRDS: evidence of troublesome or nuisance birds.	Eliminate food sources. Use exclusionary tactics at roosting/nesting sites; * Thin tree foliage. * Install wires, screen, netting, etc. * Use frightening devices. Trap: direction provided by Sonoma County Agricultural Commissioners Office.

LUTHER BURBANK HOME & GARDENS

The Luther Burbank Home & Gardens is a two acre site in downtown Santa Rosa that was Burbank=s residence and where he conducted a large part of his plant research. This site is a Registered National Historic Landmark and is visited by thousands of people from around the world annually.

The gardens offer a glimpse at the wide variety of plant materials with which Burbank worked. These are displayed in demonstration gardens throughout the site and include species that he worked with as well as varieties that are representative of those he developed. Other garden displays include a drought tolerant garden, sensory garden with plants selected for touch and smell qualities, a garden designed to attract birds and a border garden that illustrates the plant materials used for landscaping in Burbank=s day.

Because of the amount and variety of landscape materials found in the Gardens, insect pest and plant disease levels can reach high levels quite rapidly. Insect pests rarely reach those levels requiring chemical treatment because this wide plant diversity supports a variety of beneficial insects. Plant diseases however, can and do reach damaging levels quite rapidly. Fortunately, most of these diseases are host specific and do not spread between different plant species.

Much of the maintenance activities inside the Gardens is thankfully performed by a large contingent of knowledgeable volunteers whose various tasks include hand removal of pests and plant parts that infested or infected with insects or disease. Additionally, these volunteer can provide the visitor with valuable horticultural information including integrated pest management.

**PEST MANAGEMENT
ACTION PLANS**

LOCATION	ACTION THRESHOLD	ACTION
ROSES	<p>RUST: susceptible varieties showing 15% of foliage infected with rust, OR Weather conditions favor development of disease ; 55-75EF and wet foliage.</p>	<p>Provide proper soil moisture and fertility.</p> <p>Remove infected plant parts including those which have fallen.</p> <p>Remove infected canes when dormant pruning.</p> <p>Avoid overhead watering.</p> <p>Treat with fungicide.</p> <p>Apply fungicide with dormant spray.</p> <p>Replace with resistant varieties.</p>
	<p>BLACKSPOT: Susceptible varieties showing signs of infection on 10% of foliage, OR Weather conditions favor development of disease ; 55-75EF and wet foliage.</p>	<p>Provide proper soil moisture and fertility.</p> <p>Remove infected plant parts including those which have fallen.</p> <p>Remove infected canes when dormant pruning.</p> <p>Avoid overhead watering.</p> <p>Treat with fungicide.</p> <p>Apply fungicide with dormant spray.</p> <p>Replace with resistant varieties.</p>

LOCATION	ACTION THRESHOLD	ACTION
ROSES, ZINNIA, DAHLIA, CALENDULA, OTHER SUSCEPTIBLE BEDDING PLANTS.	POWDERY MILDEW: Susceptible varieties showing signs of infection on 10% of foliage.	Provide proper soil moisture and fertility. Remove infected plant parts + those which have fallen. Remove infected canes when dormant pruning. Prune to promote air circulation. Apply water in mid-afternoon (on roses: only to varieties resistant to Blackspot and Rust). Treat with fungicide + with dormant spray. Replace with resistant varieties.
ROSES	APHID: 15 aphid found on terminal 6 inches including flower bud.	Insure proper cultural needs, avoid high nitrogen levels.
STONEFRUITS	APHID: 10 aphid found on any 10 leaf sample, OR Distortion affecting 15% of foliage.	Water wash at any time. Remove infested parts. Control ants if possible. Treat with insecticide, + with oil in dormant spray.
GLADIOLUS	THRIPS: 2% of foliage showing damage.	Insure cultural needs. Remove severely infested plants. Introduce beneficials. Treat with insecticide. Rotate beds in future years. Remove corms to dry.

LOCATION	ACTION THRESHOLD	ACTION
All landscape plants.	MITES: damage visible on 25% of foliage.	<p>Address cultural needs.</p> <p>Address problems that promote population build-ups.</p> <p>Inspect for beneficial species.</p> <p>Treat with miticide.</p>
	WHITEFLY: individuals of any growth stage present on 10% of foliage.	<p>Address cultural needs.</p> <p>Inspect for beneficial species.</p> <p>Release parasitic wasps.</p> <p>Remove infested plant parts.</p> <p>Treat with insecticide.</p>
	SCALE: visible on 15% of branches.	<p>Address cultural needs.</p> <p>Inspect for beneficial species.</p> <p>Remove infested plant parts.</p> <p>Treat with insecticide.</p> <p>Use oil in with dormant spray.</p>

APPENDIX A (cont.)

Future Growth

While the goal is to reduce pesticide use it must be recognized that pesticides may need to be used on properties acquired in the future which could conceivably result in a net increase in pesticides used.

For fairness in application, increases (or decreases) in properties will be factored per the following;

Added or removed in 1 st quarter of year	=	100% of total acreage added (subtracted)
2 nd quarter	=	75%
3 rd quarter	=	50%
4 th quarter	=	25%

APPENDIX B

Those pesticides carrying the signal word DANGER represent the most toxic or hazardous pesticides available. The use of these pesticides are not presently warranted by the Department nor would their use be normally considered for the control of pests.

Future problems cannot be anticipated or ignored. In order to prevent common or casual use of this group of pesticides, the following criteria must be met prior to the use of a pesticide carrying a DANGER label.

- A. A complete literature search pertaining to the pest and its control has been performed.
- B. All practical non-chemical control methods have been utilized without success.
- C. All chemical controls beginning with the least toxic have been utilized without success.
- D. Pest management professionals have been consulted and their consensus finding is that without use of the above classified pesticides the result would be;
 1. An extraordinary health or safety hazard.
 2. The spread of a devastating pest or disease.
 3. A potential for severe economic damage or loss.
 4. The loss of an irreplaceable plant specimen.
 5. Any other situation for which the use of these pesticides might be justified.

Selection of pest management professionals will be based on those individuals widely recognized as experts in the particular field as the pest accounting for differences in pest management philosophy and approach so as to give the widest view possible.

It should be understood that any use of these chemicals could require implementation of stricter use measures that would further reduce potential for contact or exposure than outlined elsewhere in the program.