

Pest Management Alliance Project Final Report

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Model Integrated Pest Management Plan for Schools

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Measures**

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Executive Summary

The purpose of the Model Integrated Pest Management (IPM) Plan for Schools is to address some of the challenges schools face in adopting an IPM program by providing models for 1) engaging people and motivating them to use IPM, 2) implementing an IPM program, 3) establishing opportunities for peers to exchange IPM information and receive recognition for their work, and 4) evaluating the program's initial and long-term success.

Project Summary

In this first year of our project we gathered background data, engaged a large number of people, developed various tools and educational materials, and conducted trainings. To collect baseline information, we assessed the state of pest management at three Marin County schools and developed an Assessment Tool that can be used to collect similar information from other schools. Using the information we collected, we designed and conducted training for maintenance directors, grounds-keepers, custodians, teachers, and parents and prepared educational materials for these groups as well as for school board presidents, superintendents, the County Board of Education, and the County Office of Education. School staff in Marin County logged 285 hours of training in IPM and the Healthy Schools Act.

We conducted extensive outreach through published articles, presentations, a web site, and hours of personal contact to all levels of the school community. Tens of thousands of members of the general public read articles about our project in newspapers. In Marin County, 4000 to 5000 school families (including teachers) received written information about our project, the Healthy Schools Act, and IPM via school newsletters. An additional 525 teachers received similar information in a teachers' newsletter. Through presentations to pest control operators, pest control advisors, teachers and other school staff, city parks and recreation staff, public agency staff, and community activists, we extended our outreach to other Bay Area Counties and the Sacramento Valley.

To monitor compliance with the Healthy Schools Act and to learn which pesticides schools were using, we asked Marin County school districts to file their annual letters of pesticide use notification with the County Department of Agriculture. We found this to be an efficient process. Within three months, 74% of our schools had already complied.

To facilitate the exchange of IPM information, we held the first School IPM Exposition at San Marin High in Novato. It attracted hundreds of people from all over the State who were interested in learning about IPM in schools. Attendees included school personnel, pest control operators, regulators, consultants, academics, non profits, and activists.

During the course of this project, we have developed materials that we hope will be useful to school districts and consultants trying to implement IPM programs. Our assessment tool is designed to be self explanatory, and our training materials are applicable anywhere in the State. These materials can be found in the appendices. We have also included the text of letters and articles that we have written and the text of our web site (<http://www.co.marin.ca.us/depts/Ag/main/index.cfm>) to serve as examples for other districts.

Barriers to Implementing IPM in Schools

We have explored the barriers to implementing IPM in a school system, and those we have found fall into three categories: lack of time and money, lack of knowledge, and lack of communication.

Lack of Time and Money

The tools and knowledge exist to implement IPM in schools, but the obstacles come in transferring the information and techniques to those who need them. Schools are under-staffed and staff are over-scheduled, so it is difficult to find a convenient time to hold training. With limited budgets, schools are reluctant to allow staff time off for IPM

training that may be perceived as non-essential. Because of one or the other of these problems, we had trouble gaining access to teachers, administrators, and grounds and maintenance personnel.

IPM training for school maintenance personnel is badly needed all across the State. Money from government grants can help begin the process of training, but unless training funds become available from the State, school districts will have to provide their own funding for initial IPM training and continuing education thereafter. Perhaps the greatest success of this project was to show maintenance directors in Marin County the value of high-quality IPM training and to inspire them to explore finding ways to fund more countywide IPM training through budget allocations and joint powers agreements.

We have found that in Marin County schools, maintenance and grounds personnel are well aware of the major pest problems at their schools, but they often lack the time and staff to deal with those problems; consequently, they have difficulty implementing long-term solutions. The upkeep of grounds and buildings has been neglected. Many playing fields are in poor shape, and buildings are in need of repair and pest proofing.

Pest management is so low a priority or interest that it is very hard to bring it to anyone's attention without a crisis or pressure from laws or parents. By linking pest prevention with considerations of security and energy savings, all of which involve sealing a structure, we may be able to capitalize on the concern surrounding these more high-profile issues.

Lack of Knowledge

School maintenance and grounds personnel are resourceful and are creating their own pest management plans that include IPM practices, but often, because of lack of knowledge, these plans are missing components that would make them truly effective. Staff may understand that mowing will control weeds, but then they mow after seed heads form so that mowing only facilitates the weed's dispersal.

Other members of the school community, such as teachers, staff, parents, and students, don't understand how availability of food and habitat contribute to pest infestations. This lack of knowledge combined with lax standards for school sanitation result in many pest problems that could be avoided.

From conversations with maintenance directors, we conclude that school principals are the key to the upkeep and cleanliness of a school site. In schools where the principal makes these issues a priority, sanitation rules are enforced, money and time are set aside for maintenance, and IPM is easier to implement. This is the exception to the rule, however. Most principals see themselves primarily as curriculum developers; the grounds and physical plant are not their responsibility. Our challenge is to find a way to change this perception, and to have principals impress upon their staff the importance of sanitation and orderliness. We suggest introducing an incentive and recognition program for the best maintained school.

Lack of Communication

Maintenance directors and their staff are the repository of a vast amount of information and expertise in pest management at their particular sites. Some districts have creatively solved problems that other districts are still struggling with. Providing a forum in which districts can share their knowledge and experience would benefit everyone. Marin County has already taken the first step in this process by having regularly scheduled meetings for their school maintenance directors. Unfortunately, we know that other counties are not as well organized.

Communication between parents and pest management staff is also poor. We know that some parents have a general perception that school pest management programs are worse and more risky

than they really are. This leads pest management staff to think that parents are over-reacting. Some parents have concluded that maintenance and grounds staff will refuse to try new alternatives because they fear increases in work and costs along with compromises in aesthetics. We found, at least in our three target schools, that the most common reason for staff hesitation in implementing alternative pest management practices was lack of information and knowledge.

Because pest management involves the entire school community, it is important to establish a network of communication. We have found that administrators, teachers, and non-pest management staff are all so busy that finding the time for even introductory sessions on IPM takes considerable persuasion and coordination. However, it is essential that these groups understand their roles and responsibilities in the IPM process so they can support the staff who will be implementing the program. Inter-departmental communication must also be improved so that everyone is aware of how their behavior and decisions affect pest management.

We are still learning and exploring how best to help California schools implement IPM. The challenges are numerous, but our experiences, along with the information we have gathered and materials we have developed, will help other schools avoid some of the problems and pitfalls and will provide valuable resources for districts that wish to begin the process of adopting IPM.

Introduction

With the growing concern over the use of pesticides, many school districts have begun to revise their pest control programs to include integrated pest management (IPM). Although IPM practices for schools have been researched and field tested, and educational materials are available to assist school districts in using IPM, there still remain many challenges in implementing IPM programs. The purpose of the Model Integrated Pest Management Plan for Schools was to address a number of these challenges.

This Pest Management Alliance Grant had four primary objectives: establish baseline data for current pest management activities, develop an IPM training program, develop an outreach program, and coordinate demonstration projects.

Objective I: Establish Baseline Data of Current Pest Management Activities

Tasks to establish baseline data for the project included the following:

1. Select school sites for the assessment.
2. Select industry experts for the site assessments.
3. Design an assessment tool for gathering baseline data, a tool that could be used elsewhere in California.
4. Conduct a site assessment at each of the target schools.

We chose three Marin County public schools in three different districts: Bacich Elementary School in the Kentfield School District, Miller Creek Middle School in the Dixie School District, and San Marin High School in the Novato Unified School District.

We hired three IPM industry experts to conduct the school assessment and divided the assessment into three parts:

1. Landscape and outdoor nuisance problems were assessed by Michael Baefsky, Baefsky and Associates, Orinda, CA.
2. Structural, vertebrate, and food service problems were assessed by Mike Wolf and Dan Lepez, ipm-BioCare, Novato, CA.
3. The human component in pest problems was assessed by Phil Boise, Community Environmental Council, Santa Barbara, CA.

We designed forms to facilitate information gathering during the assessments. Using the IPM experts' experience and the information they gathered during their investigations, we refined the forms into the Assessment Tool that can be used in evaluating the state of pest management in other California schools.

One of the tasks of the first objective was to gather budget figures from each school for all areas connected with pest management. In interviews, however, it became clear that this would be practically impossible. These school expenses are not categorized as pest management line items, but instead are classified as pest management, custodial, maintenance, and other expense categories. These expenses are distributed between district and site budgets and between in-house and contract activities.

Since IPM is in fact an integration of many non-chemical management practices, it would have

been difficult to extract the labor costs of normal maintenance activities that may have a direct or indirect impact on pest populations. For example, sanitation, structural repairs, or various landscape maintenance activities all have an effect on pest populations, but could not be isolated as pest management expenses.

We feel that information on the cost of conventional pest management versus the cost of IPM is very important, but as far as we know, no one in the U.S. has reliable figures on these costs. We recommend that this be the subject of a separate study.

Objective II: Develop a Training Program

Task to develop a training program included the following:

1. Evaluate baseline data to determine training needs.
2. Contact target schools as well as other schools in the County to inform them of our project and the value and availability of training programs.
3. Coordinate training programs.
4. Obtain feedback through various means to evaluate trainings.

Using information from our assessment of the three target schools, we developed a training program that included the following audiences: maintenance directors, custodians, groundskeepers, teachers, and parents. Custodians and groundskeepers received the most intensive training.

We found we had sufficient funds to open the trainings and the information sessions to districts throughout the County, in addition to our target schools.

We did not conduct a formal training for the County Board of Education, local school board members, or superintendents. Their busy schedules effectively prevented us from being able to hold training sessions for them, so we provided these groups with written information and communicated with them via email and telephone.

Objective III: Develop an Outreach Program

Tasks to develop an outreach program included the following:

1. Determine the key groups to be educated about the Healthy Schools Act, IPM in schools, and the Model School IPM Plan for Schools.
2. Determine how best to reach key groups.
3. Develop communication with representatives of the key groups.
4. Produce materials for education and publicity including articles for publication, fact sheets, and a web site.
5. Coordinate presentations, publicity, and peer recognition.

The goals of the outreach program were to educate a wide variety of audiences about the Healthy Schools Act, to publicize the Model IPM Plan for Schools, and to bring and keep IPM and pest management concerns within the purview of these audiences. We made presentations, published articles, wrote fact

sheets, developed a web site, and communicated by phone, email, and in person with various members of the school community, with concerned citizens, and the general public.

Objective IV: Coordinate Demonstration Projects

The task to coordinate demonstration projects consisted of the following:

1. Organize, publicize, and produce the first IPM Expo.
2. Provide training in the use of the Assessment Tool.

Lyn Hawkins, IPM Consultant, designed and coordinated the first School IPM Expo which was held at San Marin High in Novato on July 18, 2001.

The second goal of Objective IV was providing training in the use of the Assessment Tool. We designed the Assessment Tool so that it could be used without training because we thought it would be more useful to other schools. Nevertheless, we did explain the use of the Assessment Tool to the Maintenance directors from the three target schools during their school inspections that were conducted by our IPM experts. Other Marin County maintenance directors, custodians, and grounds-keepers were trained in the use of specific aspects of the Assessment Tool in the structural and landscape IPM trainings.

Results

Objective I: Establish Baseline Data of Current Pest Management Activities

We chose to gather baseline data from different districts and from three educational levels to broaden our perspective and to perhaps reveal important differences. In our assessments however, we found that the grade level of the school did not make a significant difference in the type of pest problems or in the pest management practices that we found. Although elementary schools may be less likely to have extensive playing fields and high schools may be more likely to have lockers and showers, the variables that affect pest problems and their management are factors such as the wealth or poverty of the school district, the interest in safe pest management, and the type of landscaping and construction at the school.

Michael Baefsky and Dan Lepez both spent half a day inspecting each school. They met with school staff about pest management history, current pest problems, and pest management practices at each site, and then inspected the grounds and buildings.

Phil Boise devised a questionnaire (see Appendix A under Pest Control Survey) to survey the school community about their perceptions of pest management, current pest management policies, organizational structure, training, and changing pest management practices. He also spent time interviewing school personnel in person and on the phone to better understand attitudes toward pest management.

The Assessment Tool we designed as a template for use in other schools across the state can be found in Appendix A.

Results of the Structural and Landscaping Assessments

Results are summarized below. For more detailed information, see the Assessments of Current Pest Management Practices in Appendix B.

Staff and Budget Deficiencies for Building and Landscape Maintenance. The most important finding is that buildings and grounds personnel are well aware of the major pest problems and the conditions in their schools that lead to pest problems, but they often lack the staff and budget to monitor problem areas and to implement preventive measures and long-term solutions.

Fine Tuning Landscape Pest Management Practices. We determined that the most effective role pest management experts can play is helping these three schools fine tune management strategies, and suggesting practical long-term solutions for specific problems. For instance, schools need help in timing treatments to be most effective. Two schools were mowing their populations of yellow star thistle, but mowing after the seed head had formed so that mowing facilitated seed dispersal.

Over-used Playing Fields. One problem we encountered is playing fields that are used 12 hours a day, seven days a week, all year long. Without periods of rest, turf health declines and the fields become highly vulnerable to many different problems. We found this to be true for other schools in the County as well. One school has solved this problem by rotating playing fields so that one field is always resting for six months to a year. Although many schools may not have the luxury of an extra field, rotation is still a solution to be considered at other schools.

Communication and Coordination. Communication and coordination among departments in the three schools needs to be improved. Pest management involves the entire school community. Because principals and teachers do not understand the connection between food in the classroom and pest invasions, policies that could facilitate pest management are not made, or if they exist, they are not enforced.

In addition, there is not enough communication among school district maintenance staff across the County. Some districts have creatively solved problems that other districts are still struggling with. Providing a forum in which districts can share their knowledge and expertise would benefit everyone.

Monitoring and Record Keeping. Monitoring and record keeping need improvement at all three schools. Pesticide application records are kept for each school, but the schools do not record pest infestations or any treatments other than pesticide applications. Although some monitoring is occurring at each school, we recommend a higher level of monitoring linked with written records.

IPM Training. We found that school staff were not receiving training in IPM implementation and techniques.

Key Pests. As expected, the key pests in the three schools are similar to those found, in our experience, in other schools in California and in the country.

Outdoors: the main problems are weeds, yellowjackets, birds, pocket gophers, and ground squirrels. Each school had areas of standing water next to structures. This problem is caused by improper grading or poorly functioning drainage systems and can lead to serious structural problems with termites and fungal decay.

Indoors: the main problem was Argentine ants. Rats and mice were a concern only at one school, but the potential for rodent infestations exists at the other two schools due mainly to un-repaired holes in structures that could provide rodents with access to building interiors. Although school staff did not cite cockroaches as a problem, nor did our inspections reveal any evidence of these insects, there is always a potential for cockroach infestations in schools. A similar situation exists for potential infestations of animals such as opossums, skunks, and raccoons.

Pesticides Used. Few pesticides are being used officially at these schools, and all three schools strongly discourage any unofficial use of pesticides by teachers or staff. From fall 2000 to fall 2001, the number of pesticides used at the three target schools diminished. In fall 2001, they were using two fewer pesticides and four fewer herbicides.

In fall 2000, maintenance and grounds personnel in the target schools reported using the following pesticides:

Microencapsulated diazinon (PT265A[®]) for ants
Microencapsulated diazinon (Knox-Out[®]) for yellowjackets
Diphacinone (Gopher-Getter III[®]) for pocket gophers
Permethrin (Dragnet[®]) for red turpentine beetles on Monterey pines
Roundup[®], Trimec[®], Turflon[®], Mecomec[®], Gallery[®] 75, and Pre-M[®] (herbicides)

In fall 2001, the three target schools reported the following pesticides in their parent notification letters as required by the Healthy Schools Act:

Chlorophacinone (Gopher-Getter II[®]) for pocket gophers
Permethrin (Prelude[®]) for red turpentine beetles on Monterey pines
Roundup[®] Pro, Roundstar[®] (herbicides)

Results of the Human Component Assessment

Results are summarized below. For more detailed information, see Pest Management Perceptions and Needs Assessment in Appendix B.

From our survey, we found that the highest pest management priorities for teachers, parents, staff, and maintenance directors at the three target schools were better communication, more information, and greater risk reduction. The majority of all respondents said they would change their current pest management system to reduce the risk associated with pest management. The barriers and incentives associated with this are primarily functions of communication and information.

A total of 43 surveys were returned:

Staff (any respondent employed by a school district): 28 total

5 district and site custodians

7 district and site grounds and maintenance

7 teachers

4 principals

1 superintendent

1 classified position

1 listed as “rsp”

2 of unknown job description

Non-staff (any respondent not employed by a school district): 15 total

13 parents

1 trustee

1 student (high school)

Changing the Current Pest Management System. The most compelling reason to change the current pest management system was risk reduction (67% of staff and 93% of non-staff). The second most compelling reason was “increased efficiency and oversight” (63% staff and 27% non-staff). Respondents ranked saving money and reducing costs as the last two reasons to change the current system.

Parent Perceptions. Parents thought that their needs and concerns should be addressed in the operation of the schools, and that meeting those needs and concerns is a compelling reason to change the current pest management system of the school. Parents perceive the risk from pesticide exposure to be high while school staff perceive the risk to be very low. Parents also thought that the primary factors limiting the use of least-toxic pest controls in their schools were fear of increases in labor and materials costs and fear of compromising aesthetic standards. In reality, school staff chose “don’t know” and “lack of technical information/support” as limiting factors. No school staff chose “anticipated increase in materials cost.”

Training. The topics considered by staff and non-staff to be the most important to include in training programs were, in order, health effects of pesticides, how to identify and prevent pest problems, and non-chemical management practices that maintenance and grounds personnel could implement in their schools.

The main barriers to training were listed as scheduling problems, lack of interest on the part of staff and teachers, and cost. Staff indicated that providing continuing education credit would be an incentive for attending training.

Satisfaction with the Current Pest Management System. Satisfaction with the current pest management system shows room for improvement. Non-staff rated their satisfaction at 38%, and staff rated satisfaction at 50%. Staff satisfaction levels, coupled with the high response of staff who

see “improving efficiency and oversight” as a compelling reason to change the current system, indicate that the efficiency, decision-making process, and oversight of IPM can appeal to many school staff.

Objective II: Develop a Training Program

Training Overview

We used the information from the assessment to develop training materials for all levels of school personnel but experienced varying degrees of success in providing these audiences with training. The lack of any commitment district by district to facilitate training combined with busy work schedules to make it very difficult for us to gain access to staff to train them. Consequently, not all levels received formal training.

We spent the most time and money on developing classes for maintenance directors, custodians, and groundskeepers. We felt that these three groups, because they deal directly with pest management, should receive the most extensive and technical training. Maintenance directors were invited to both the landscape and structural IPM trainings because they supervise custodians and groundskeepers.

Parents and teachers were our next two priorities. We spent considerable time and effort to reach these two audiences with mixed results as can be seen below.

Because of the very limited availability of administrators and elected officials, we realized we would not be able to gather them for an hour lecture/demonstration on IPM. Instead we provided them with information packets and kept them informed of our plans and progress throughout the year.

Recognizing the Value of IPM Training

Because we were able to offer training for grounds and maintenance personnel throughout the County, we contacted all district maintenance directors to explain the trainings. We made a preliminary survey to assess interest in the classes and to determine the best times to give them.

All the maintenance directors indicated great enthusiasm for the structural and landscape IPM classes we had planned. Everyone seemed anxious to attend and to have their staff attend; however, when we began asking for commitments, the enthusiasm seemed to dwindle. After sending each maintenance director an invitation (see Appendix C) explaining the classes and our project and then sending several email reminders, we spent many hours on the telephone trying to persuade people to come.

It was easier to fill the structural IPM class because it was a single session, three hours long. Fifty-three people attended (the limit had been 50), although almost half of those came from one large school district. The landscape IPM class met for two hours once a week for four weeks and this longer commitment was more difficult for the staff. The 15 people who attended the landscape IPM workshop fell far short of the 25 person limit. Unfortunately, we were not able to convince all of our target schools to attend both trainings.

The morning of the last landscape IPM class, four of the groundskeepers were told they could not attend the class because they were needed for a work project. This seemed to epitomize the low value placed on the training as well as school staffing problems. After we spoke to their maintenance director and supervisor and explained the importance of their attending the last class to finish the training they had begun and to receive their certificates of completion, the four were allowed to attend.

The school staff who did take the workshops were excited by what they learned and anxious to learn more. Participants in Michael Baefsky’s landscape IPM workshop mentioned several times that they “loved the

class.” Other comments included, “great information, excellent program, practical instruction, enthusiastic instructor, should be more of these sessions throughout the year.” These staff must have taken their enthusiasm back to their districts because several months later in a maintenance directors meeting, we were surprised to find that the maintenance directors had taken the initiative in seeking additional funding for more countywide IPM training through budget allocations and a joint powers agreement.

Description of Training Program

Custodians and Maintenance Directors. Mike Wolf and Dan Lepez of ipm-BioCare developed a structural IPM class for school personnel (see training outline in Appendix D) and conducted a three-hour training session for custodians and maintenance directors on July 23, 2001. The goals of this class were to provide information on the Healthy Schools Act, introduce the concepts of IPM, emphasize the importance of monitoring and pest prevention, provide the participants with a brief introduction to the biology of the most common school structural pests (ants, rodents, and birds) along with some practical controls, and to show them how to inspect a building for pest problems and conditions that lead to pest problems.

Fifty-three people attended representing nine (75%) of the 12 major districts in Marin County. The seminar was divided into a lecture and slide presentation followed by a walk around the school site to demonstrate a site inspection. See Appendix E for training materials developed for this class.

Evaluations from the class were quite favorable (see evaluation summary in Appendix D). Seventy-seven percent of those responding to the question, “What part of the workshop was most useful to you?” answered “both,” i.e., the lecture and the guided inspection. The majority (55%) thought the workshop was the right length and 38% thought it was too short. Other comments included “It was very informative.” and “Workshop was excellent.”

Groundskeepers and Maintenance Directors. Michael Baefsky of Baefsky & Associates developed a landscape IPM workshop for school personnel (see training outline in Appendix F) and led a series of four two-hour sessions for groundskeepers and maintenance directors on four Fridays from July 20 to August 10, 2001. The goals of this workshop were to provide information on the Healthy Schools Act, introduce IPM concepts and to provide school staff with enough pest management information that they could begin making changes at their schools.

Fifteen people attended representing seven (58%) of the 12 major districts in Marin County. The class covered four main topics: weed IPM in non-turf areas, turfgrass IPM, IPM for stinging hymenoptera, and vertebrate IPM. Each session was divided into an hour lecture/demonstration and an hour of field exercises. See Appendix G for training materials developed for this workshop (these include both the training script and the handouts).

As noted above, comments from the evaluations (see evaluation summary in Appendix F) were very positive. We asked about the major obstacles to implementing the concepts and practices presented in the class. The two most important obstacles were lack of time (12 out of 13 respondents or 92%) and lack of staff (6 out of 13 or 46%). We also asked participants if they would be interested in attending a periodic meeting of groundskeepers and supervisors to discuss problems and successes and to have a speaker on a topic of concern to the group. Thirteen out of 14 (93%) said yes, and the most popular frequency for the proposed meeting was quarterly.

Parents and Teachers. Phil Boise of the Community Environmental Council in Santa Barbara developed a school IPM information night (see training outline and handouts in Appendix H) and

led a discussion with parents and community members on July 17, 2001 and again on October 18, 2001. The goal of these evenings was to present information about the Healthy Schools Act and to introduce IPM concepts. We stressed that IPM is neither the cessation of pesticide use nor the substitution of less hazardous chemicals for more hazardous chemicals. We also wanted to help parents realize that in their campaign to reduce pesticide use, cooperation with school personnel and an understanding of the problems of their workplace will produce faster results than antagonism and blame. At the end of the evening, participants had time to ask questions and voice their concerns.

Thirteen people attended the July 17 meeting and 18 attended on October 18. Although the July meeting was only lightly advertised, advertising for the October 18 evening was extensive. Notices appeared in all Marin newspapers; a poster (see Appendix H) was sent to bookstores, health food stores, libraries, and pediatricians' offices; a flyer (see Appendix H) was sent home in the backpack mail or school newsletters of about 75% of the students in Marin County; and a short article (see Appendix H) describing the Model School IPM project and highlighting the meeting was published in about 25% of the school newsletters in the county.

The poor attendance on both nights suggests several things: 1) advertising the event made little difference in the attendance, 2) parents are extremely busy and are reluctant to attend school functions unless they consider them a personal priority, 3) because of heavy advertising combined with an outreach campaign, parents perceive that someone is taking care of the pesticide problem and it can be relegated to a low priority.

Teachers. We spent a number of hours trying to contact and persuade the superintendents of our three target schools to allow us to make a 20-minute presentation (see Appendix I) to their teachers before school began in August 2001. Our goals were to inform teachers of the Healthy Schools Act and to make them aware of the connection between pests and food in the classroom.

We were successful in making only one presentation to Marin teachers, and that was not for a target school but for the Sausalito School District. This was a direct consequence of the maintenance director's having attended both the structural and landscape IPM trainings. Twenty teachers and staff attended, virtually all of the educational staff of this small district. As a result, teachers requested spray bottles with disinfectant for their classrooms to clean surfaces and wipe up ant trails. Lester Lyons, the maintenance director, complied within the week.

Outside of Marin County, we were more successful in reaching teachers. Tanya Drlik had the opportunity to lead four two-hour IPM training sessions (see Appendix J for training outline) as part of seminars sponsored by the Aquatic Outreach Institute:

09/23/00: 45 teachers from Alameda and Contra Costa Counties
10/13/01: 30 teachers from Contra Costa County
10/27/01: 20 teachers from Santa Clara County
11/03/01: 20 teachers from Alameda County

These training sessions not only helped to educate Bay Area teachers about the Healthy Schools Act and our project in Marin, but also gave us a chance to learn more about pest problems from the teachers' perspective.

Superintendents, Local School Boards, County Board of Education, County Office of Education.

After a number of attempts to set up a formal training for these groups, we concluded that we were not going to be successful in getting them to spend any length of time with us in a meeting discussing pest management. Instead we communicated with them frequently via U.S. mail, email, and telephone to provide

them with information about the Healthy Schools Act, explain our project, and to keep them informed of our activities throughout the year.

The following items were sent to each superintendent and member of the County Board of Education, and to the president of each local school board:

Project summary for the Model IPM Plan for Schools
Definition of IPM
Landscape and Structural IPM Workshop Flyers
Policy Clarifying State & County Roles in Enforcing Provisions of the Healthy Schools Act
Letter from Delaine Eastin regarding the Healthy Schools Act
AB 2260 (Healthy Schools Act)
DPR's Overview of the School IPM Program
DPR's Information Sheet for Parents Regarding AB 2260
DPR's Sample Letter to Parents regarding annual pesticide notification
DPR's Sample Annual Notification of Planned Pesticide Use
DPR's Sample Notice for Specific Pesticide Application
DPR's Sample Pesticide Treatment Posting
DPR's School IPM Program information sheet
DPR's Upcoming Presentations on the Healthy Schools Act

Objective III: Develop an Outreach Program

Components of the Outreach Program

Maintenance Directors and IPM Coordinators. In December of 2000 we attended a maintenance directors' meeting to discuss their pest management problems and to explain our project. In June 2001, maintenance directors received a letter (see Appendix C) to remind them of our project and to personally invite them to the training sessions. This letter was followed by a series of phone calls. In October of 2001 we attended another maintenance directors' meeting to discuss the project results and to solicit opinions about the most useful aspects of the project and to ask their advice about future directions.

Throughout the year we had periodic phone and personal contact with the maintenance directors of our three target schools as well as with a number of other maintenance directors. We visited several schools in addition to our target schools to learn more about the maintenance directors' responsibilities and their problems.

Jeff Winkler, IPM Coordinator for the Larkspur School District in Marin County, asked us to review the Larkspur IPM policy and administrative regulations before they were presented to the school board for consideration. Tanya Drlik was asked to sit on the IPM Advisory Committee for the Larkspur School District.

We have formed close working relationships with a number of the Marin County Maintenance Directors. We have gained their confidence and respect, and they know they can rely on us for help with pest management issues.

Peer Recognition Program for Maintenance and Grounds Staff. Professional recognition for school maintenance directors and groundskeepers was provided through DPR continuing education credits for those with licenses. Several of the workshop participants mentioned to us that they had decided to obtain a Qualified Applicator License or a Qualified Applicator Certificate because of the training.

Certificates of completion (see Appendix K) were issued to each participant in the landscape IPM training and distributed by the Stacy Carlsen, Marin Agricultural Commissioner, at their last class.

Ron Warfield, Manager of Operational Services, Novato Unified School District, was honored with an IPM Innovator award from DPR for his work on the Novato School District IPM program. He also received a letter of congratulations from Cynthia Murray, Marin County Supervisor, 5th District. (see Appendix K).

Parents and Teachers. Both teachers and parents were the target audience for the parent information night led by Phil Boise. We also developed a series of articles appropriate for teachers and parents (see Appendix L) that we submitted to various publications.

- 09/20/01: Articles on ants in the classroom, the Healthy Schools Act, and the project were sent to every principal in the County with a letter from Mary Jane Burke, County Superintendent of Schools, asking that they be included in the PTA or school newsletters. To date these articles have been published in half of the 44 middle and elementary schools to which they were sent. They have reached between 4000 and 5000 families (this includes the families of teachers). The other half of the schools indicated they would publish the articles in the near future.
- 09/25/01: Article on the Healthy Schools Act sent to *Bay Area Parent*
- 09/26/01: Article on the Healthy Schools Act, IPM, and the project sent to *Parents Press*
- 10/15/01: *School Garden News* from the Marin County Stormwater Pollution Prevention Program (MCSTOPPP) was sent to about 500 teachers in Marin County. The newsletter featured articles on ants in the classroom, the Healthy Schools Act, and a summary of our project. The newsletter was distributed to 25 more teachers in a gardening workshop sponsored by MCSTOPPP.
- Fall '01: An article on the Healthy Schools Act was submitted to *The California Educator*, the monthly journal of the California Teachers' Association, but has not yet been published.

Superintendents, Local School Boards, County Board of Education, and County Office of Education. Throughout the project we were in frequent contact with Mary Jane Burke, County Superintendent; Luke McCann, Assistant County Superintendent; and Lila Wilkins, Director of General Services, Office of Education to seek advice and to keep them informed of our plans and our progress. We formed close relationships with these three people, and they provided invaluable insight into the workings of Marin County Schools. We succeeded in raising the pest management and IPM awareness of the County Board and the Office of Education and received a letter of commendation from Mary Jane Burke (see Appendix M).

We also succeeded in raising district superintendents' awareness of IPM and the Healthy Schools Act. We contacted all Marin County superintendents to request they file their parent notification letter with the County Department of Agriculture (see Appendix N). This allowed the Department to monitor initial compliance with the Healthy Schools Act and to offer assistance to districts with questions about provisions in the law. The Department has also offered to make reference materials available to parents who may have questions about pesticides used in their district.

We have had excellent compliance with the annual parent notification of pesticide use. To date we have received 14 out of 19 (74%) of the notification letters we asked to have filed with the County Department of Agriculture. We have contacted the last five districts by telephone or email to offer them assistance.

We explored submitting an article to *Leadership*, the journal of the Association of California School Administrators, but this journal publishes only articles that fit into the theme chosen for each issue. The

editorial staff informed us that pest management would not fit into any of the themes planned for September 2001 to June 2002.

In July of 2001, Stacy Carlsen, Principal Investigator and Marin County Agricultural Commissioner, gave a presentation to the County Board of Education in which he publicly recognized contributions to the project from Mary Jane Burke, Luke McCann, Lila Wilkins, and Ron Warfield (Manager of Operational Services, Novato Unified School District).

General Public, Parents, and School Staff. We solicited and encouraged newspaper articles (see Appendix O) about our project, and developed a school IPM section for the Marin County Department of Agriculture's web site (see Appendix P).

Newspaper Articles for the general public, parents, and school staff:

- SF Chronicle, 2/2/01 (Kelly St. John)
- Marin Independent Journal, 7/9/01 (Mark Prado)
- Novato Advance, 7/11 through 17, 2001 (Mary Connell)
- Marin Independent Journal, 7/19/01 (Mark Prado)
- Marin Independent Journal, 10/5/01 (Jane Futcher)

The following information has been posted to the Marin County Department of Agriculture web site:

- Components of the Healthy Schools Act (AB2260)
- How to comply with AB2260
- Description of the Marin Model School IPM project
- Fact sheets for maintenance directors on managing ants, roaches, spiders, and rats & mice
- Fact sheets for teachers and parents on managing ants, roaches, fleas, aphids, and a number of other pests
- DPR Progress Reports and Final Report for the project
- Listings of IPM trainings and other upcoming IPM events
- Links to resources for school IPM

We have extended the coverage of the Marin County Department of Agriculture web site by asking that a link to the web site be published on other IPM- and pesticide-related web sites of note, e.g. California Department of Pesticide Regulation, Californians for Pesticide Reform, The Integrated Plant Pest Center, and others

Pest Control Operators (PCOs) and School Maintenance Staff outside of Marin County. During the summer of 2001, Tanya Drlik made presentations on the Healthy Schools Act and the Marin school IPM project at "Putting IPM into Practice" Seminars sponsored by the Bio-Integral Resource Center in three locations around the San Francisco Bay Area:

- 6/28/01: Walnut Creek
- 7/9/01: Cupertino
- 7/17/01: Hayward

Attendance breakdown:

Public agency staff:	80
School staff	22
PCOs	10

She made a similar presentation in Millbrae, in December 2001, during an IPM training session for 40 staff from schools, parks and recreation departments, and public works.

Pest Control Advisors (PCAs). In November 2001, Tanya Drlik made a presentation entitled “Strategies for Implementing a Successful IPM Program in Schools” at a PAPA (Professional Association of Pesticide Applicators) Seminar in Chico. This talk included information on the Marin School IPM project. About 30 people attended.

Public Interest Groups. We met twice in the fall of 2001 with representatives from Pesticide Watch Education Fund, Californians for Pesticide Reform, California Public Interest Research Group, Marin Beyond Pesticides, and the Marin Pesticide Education Group to discuss our project. These groups were also invited to the School IPM Expo (see below, Objective IV), the parent information nights, and our Alliance meetings.

Objective IV: Coordinate Demonstration Projects

First Annual IPM Expo

On July 18, 2001 an IPM Exposition was held at San Marin High School to showcase companies that provide IPM products and services and to provide a networking opportunity for people involved in school IPM. Opening remarks were given by Paul Helliker, Director, DPR; Stacy Carlsen, Marin County Agricultural Commissioner; Cynthia Murray, Marin County Supervisor; Dr. John C. Bernard, Superintendent, Novato Unified School District.

The schedule provided ample time for viewing exhibits and interacting with colleagues. Lunch was provided by the San Marin High Booster’s Club for a nominal fee. Dr. Nita Davidson, of DPR’s School IPM Program, gave the closing talk on the Healthy Schools Act.

Twenty-six exhibitors participated including manufacturers, pest control operators, consultants, non-profit organizations, and public agencies. Over 275 people from around the State attended. They represented school districts, county departments of agriculture, universities, pest control companies, consultants, non-profits, public agencies, and city and state government (see Appendix Q for attendance list).

Evaluation

We asked participants to evaluate the Expo and to provide comments. On the evaluation we posed the following questions (the numbers of responses appear in parentheses). Seventy evaluations were returned.

How did you find the presentations by dignitaries?

Useful (46) Not necessary (0) Not helpful but appropriate (10) No response (14)

Exhibitor demonstrations and presentations

Helpful (28) Informative (38) Need more information (4) Too commercial (3) No response (16)

Laws and regulations

Excellent (11) Very good (18) OK (10) Needs improvement (2) Not necessary (0) No response (29)

The attendees were also asked to list two exhibits that were helpful or not necessary. Responses were varied. Some listed more than two exhibits as being helpful. Very few attendees listed exhibits that were not necessary and there were no repeat answers. About 1/3 of the attendees did not provide any answer to this question.

Some of the additional comments by attendees appear below:

Expo refreshing, informal, sincere, encouraging, personal

Provide many more IPM-type expos in the North Bay.

More on insects

More information on costs—chemical to biological to integrated

More information on pheromones

More on alternatives to pesticides

Selective herbicide alternatives would be helpful

Need practical scenarios...real situations

Specific instructions on developing and implementing an IPM program; need more than just handouts

Importance of sanitation in insect control and elimination should be covered

Need more structure to morning presentations

Presentation needs to be more organized.

It would be better to have laws and regs. first thing, not at end of day.

Need to present a more clear definition of IPM

Needs an enforcement person to clarify enforcement issues

How does one determine exempt products, especially new products being offered?

For the first Expo of its kind, the response, interest, and support were remarkable.

Promotion for the Expo

The event was promoted in several ways: direct mail, newspaper articles, a press conference, DPR web site, and direct marketing telephone calls (see Appendix R for printed promotional materials).

Over 150 companies and organizations were contacted as possible exhibitors. Government and non-profit organizations were also contacted and provided free exhibit space. Potential exhibitors were solicited by mail, email, and telephone calls. Thirty-one exhibitors requested space, and five did not show up.

Potential attendees were notified via the DPR web site and direct mail. Direct mail consisted of a postcard (sent to about 22,000 persons and businesses) and a newsletter (sent to 15,200 persons and businesses). We obtained mailing lists from the Department of Education for school maintenance and operations staff, superintendents, and business officers, and from DPR we obtained lists of various licensees. From a business that provides lists of web sites, we obtained a roster of structural pest control businesses.

The Marin County Department of Agriculture issued a press release that was published in the Marin County Independent Journal, and a week before the event, we held a press conference in San Francisco. Local television covered the press conference which was hosted by Precision Works, a company that uses heat as an alternative to chemical fumigation.

Discussion

Objective I: Establish Baseline Data of Current Pest Management Activities

The first goal of the pest management assessment was to gather baseline data on three Marin schools, and in that process to explore the best way to perform an assessment at a school. The second goal was to develop an Assessment Tool, or checklist, to be used as a template to help other California schools accomplish similar assessments.

We feel that an assessment is very important, especially where funds for pest management are limited. The assessment will reveal the key pests and problems areas in a school and can help focus resources where they are needed most. Using information from the assessment, training can be developed that fits the needs of the particular district or county.

Limitations of the Assessment

We found that obtaining information about pest management without putting staff on the defensive can be a delicate process. The intrinsic nature of an assessment is judgment, and no matter how personable and open the assessor tries to be, the people whose work is being examined may feel on guard or even threatened. People naturally want to look competent and successful in the eyes of others. We need maintenance and grounds personnel to speak frankly about what has not been working and about the problems they haven't been able to solve. People who feel they are under scrutiny will be reluctant to share that kind of information. For instance, asking for pesticide use reports from grounds and maintenance personnel can appear as a threat and may even shift the people whose confidence you are trying to gain from a neutral position to an adversarial one. Instead, we suggest asking the County Agriculture Department to obtain pesticide use records from schools.

It is impossible to obtain all the information about pest management at a school in a few hours. Although it is fairly easy to assess pest problems, since the pests usually manifest some physical evidence of their presence, it is much more difficult to assess institutional or communication problems in such a short time. These problems involve people rather than the other animals we call "pests." Each group within the school system may only have experience with a small part of a larger problem and it takes someone with time and perception to gain enough of an overview to clearly define the problem and then to resolve controversies and suggest realistic solutions. The institutional and communication problems bear heavily on whether or not useful changes can be made in the system. If a maintenance director or IPM Coordinator is conducting the assessment, they will most likely have a good understanding of these problems already. For an outsider to understand these problems, he or she must spend considerable time getting to know the system and the people in it.

Our written survey of school staff and parents was costly and time-consuming for the 43 surveys returned to us. Although the information we gained was interesting, it is doubtful whether its usefulness justified the cost. A more cost-effective method might be to have the school convene several focus groups; however, this assumes a commitment from the school. As we have seen, securing commitments from schools, especially for time on the part of their staff, can be quite difficult. If the school can assemble focus groups, we suggest, at least initially, the groups be separated by their job descriptions. People can be reluctant to speak candidly in front of those they perceive to be outside their group.

We now know that the most important information to obtain from the people in the system is how they do or don't communicate with each other, and the institutional and personal barriers that might exist to implementing an IPM program. The survey we designed was not particularly effective in eliciting this

information. We suspect that without employing a professional in the field (which would be very costly), it might be difficult to design a survey that could capture the needed information. Nevertheless, the survey we developed can be useful for understanding people's perceptions about pest management in their school system.

Deficiencies in Communication

We see a lack of communication and coordination among departments in schools with respect to pest management. For instance, groundskeepers may not realize that sprinklers positioned so they spray buildings will cause problems that lead to structural pest damage. Administrators don't understand that planning for renovation or new construction in either buildings or grounds will benefit from review by a pest management expert to minimize designs that lead to pest problems. For instance, buildings can be designed without the ledges that provide roosting areas for pigeons.

An illustration of this lack of communication is the way recycling is handled at some schools. Student ecology clubs are in charge of the recycling project, and student volunteers are responsible for emptying the recycling bins. The club sponsor may or may not be a responsible adult, and the bins often go un-emptied for long periods of time. Recyclables are not rinsed and sometimes not even emptied which creates a sweet and fermenting soup that is very attractive to a number of pests. Custodians complain that their job descriptions do not include emptying messy recycling bins, and periodically, they resentfully throw everything into the dumpster.

In Marin schools, we have seen undeclared war between parties sharing the school site. Some parents think that maintenance and grounds staff are unwilling to change their pest management practices and don't care about the health and safety of the children. The attitude of some custodians to the other people in the school community can be summed up in a phrase we heard at a workshop, "Parents are whiners, teachers are packrats, and students are slob." None of these groups has taken the time to try to understand the concerns and problems of any of the others.

We also found that most people have no conception of the amount of work involved in providing a service such as cleaning or pest management. They want the service, they expect it to be of high quality, and they want it to happen immediately. People give little thought to the limitations or problems in providing such a service.

Facilitating and coordinating this interdepartmental communication is difficult for outsiders, but contractors or independent consultants are in a position to raise the issue through training and through personal contact. As outsiders they can move from group to group gathering information and gaining people's confidence. With this knowledge they can help school personnel understand each other better. In a school lacking outside consultants, the IPM Coordinator must take on these responsibilities. Without a heightened awareness of the interconnections in a school system, long-range pest management planning cannot even begin.

Another aspect of school communication that needs improvement is the exchange of information among school maintenance directors throughout the County. As we have mentioned before, many schools could benefit from the experiences of innovative schools that have devised creative management plans for various pest problems. The Marin County Office of Education has a position that oversees all maintenance directors in the County, and maintenance directors attend regular meetings throughout the year. Other counties are not so well organized. We recommend that maintenance directors from across a county attend quarterly meetings that are specifically dedicated to the purpose of problem solving and sharing pest management information.

Mechanics of the Assessment

We found that a formal assessment at a school must be well-coordinated and carried out in a timely fashion so as not to unduly impose on school staff and administrators. If at all possible, one person should perform all the assessments. Our using three different people was confusing to the Marin districts, meant more coordination time, and more work shepherding the consultants' reports through to completion. If money and time are limited, we recommend conducting only structural and landscape pest management assessments and eliminating the Pest Management Survey. In that case the person conducting the assessments should try to glean as much information as possible about the problems caused by people in the system.

To aid recall and save time, assessment interviews can be taped. Detailed, oral notes about the site can be recorded to be transcribed later.

Once the assessment is finished, training should be designed to fit the key pests and problem situations discovered in the assessment.

The Assessment Tool

We decided that the Assessment Tool would be much more flexible and useful if it were self-explanatory and could be used without training. We have observed that school personnel have little time for informal monitoring, and therefore, they may have less time for a more formal assessment. This may prove a barrier to the widespread use of the Assessment Tool, but the problem may be overcome by additional education about the value of assessing a school's problems before beginning an IPM program. The exercise of going through the Assessment Tool will help school personnel better understand their pest management system and will provide them with written documentation of their situation. The Tool can also be used by consultants or pest control operators hired to help a school implement IPM. Parts of the Tool could be used to train groundskeepers or custodians in what to look for when they monitor.

Structural and Landscape Maintenance Deficiencies

We find the lack of staff and budget to conduct monitoring and to implement long-term solutions in Marin County schools troubling. This is not uncommon throughout California, indeed the United States, and we feel it has grave implications for the future of IPM in schools. The success of an IPM program depends heavily on proper sanitation, habitat modification, and preventive maintenance of both buildings and grounds.

From conversations with maintenance directors, we conclude that school principals are the key to the upkeep and cleanliness of a school site. In schools where the principal makes these issues a priority, sanitation rules are enforced, money and time are set aside for maintenance, and IPM is easier to implement. This is the exception to the rule, however. Principals are very busy and most see themselves primarily as curriculum developers; the grounds and physical plant are not their responsibility. Our challenge is to find a way to change this perception. We suggest beginning with an incentive and recognition program.

We have found that pest management is so low a priority or interest that it is very hard to bring it to anyone's attention without a crisis or pressure from laws or parents. By linking pest prevention and preventive maintenance to issues of security and energy savings, all of which involve sealing a structure, we may be able to capitalize on the concern surrounding those more high-profile issues.

Deferred Pest Management

We find a growing number of schools declaring policies of no pesticide use on their campuses. Some seem to think that no pesticide use is equivalent to IPM and some see no pesticide use as an end in itself. In either case, they are not replacing pesticides with sound pest management alternatives.

Rather, we find that schools are neglecting pest prevention and management altogether. We fear that this “deferred pest management” may cause problems in the future.

Monitoring

In Marin County schools, we observed that only minimal monitoring is taking place, and what little is taking place is not being recorded. The reasons for this are that monitoring is not seen as a priority because its benefits are not clearly understood, no job descriptions include monitoring, and there is no money or time to perform the tasks. If we consider monitoring to be the backbone of an IPM program, we must find a way in which it can be squeezed into the busy schedules and tight budgets of California schools.

We encountered one school that has an excellent yellowjacket control program, but no spring monitoring program to determine whether or not they will even need to control yellowjackets in a particular year. By instituting a monitoring program, they could save time and money by eliminating unnecessary poison baiting and in the process, reduce pesticide purchases and handling.

At minimum, the landscape department should keep records on the presence (and location) or absence of key pests, treatments for key pests (*including* non-chemical treatments), and maintenance practices including irrigation, fertilization, aeration, and mowing schedules. Structural pest management records should include the presence (and location) or absence of key pests, treatments for key pests (*including* non-chemical treatments), and conditions that may lead to pest problems. It would also be useful to record human activities that affect pest management positively or negatively.

Written records are important not only for pest management, but because they can satisfy public interest in a school’s pest control practices and document success stories to share with colleagues and the public.

Objective II: Develop a Training Program

When we began designing the training program, we wanted to thoroughly train every level in the school hierarchy. It soon became apparent that we could not afford the expense, and the schools could not afford the time. We decided to prioritize the training in the following way: first priority, maintenance directors, custodians, and groundskeepers; second priority, parents and teachers; third priority, administrators and elected officials. Maintenance and grounds personnel received the most extensive and technical training because their work involves pest management. Parents were important because we knew some schools were under pressure from parent groups interested in reducing pesticide use. Teachers directly affect pest management by their classroom activities. Administrators and elected officials were our lowest priority mainly because it was so difficult to gain access to them. We left students out of this phase of the project because of lack of time and money.

Our most challenging problem in the training program was getting people to come to classes or gaining access to various audiences. In retrospect, we should have secured a formal commitment from at least our target schools to support and facilitate training. Having someone in authority strongly suggest that staff attend training would probably have made our job easier.

IPM training for school maintenance personnel is badly needed all across the State. Money from government grants can help begin the process of training, but unless training funds become available from the State, school districts will have to provide their own funding for initial IPM training and continuing education thereafter. Perhaps the greatest success of this project was to show maintenance directors in Marin County the value of high-quality IPM training and to inspire them to

explore finding ways to fund more countywide IPM training through budget allocations and joint powers agreements.

Maintenance Directors, Custodians, and Groundskeepers

Our initial survey of maintenance directors indicated that all of them were quite interested in training and very willing to come and bring their staff. When it came to actually signing up and attending, we felt the numbers did not reflect the previous enthusiasm.

It was easier to fill the structural IPM class because it was one session that lasted three hours. It was much harder to get people to attend the landscape IPM workshop that stretched over four weeks even though each session was only two hours once a week. All of the school personnel that we talked to wanted us to give the landscape class in one eight hour session. We persisted with the four week format because eight hours of instruction in one day is too much for a single instructor, but more importantly, students can take in new information for only two to three hours at a time; the rest of the time would have been wasted. We also decided that each landscape IPM topic needed at least two hours to cover the necessary information. At that, we felt we only provided an introductory training. We unfortunately found a lack of basic horticultural knowledge among many maintenance directors and groundskeepers, and only limited skill in identifying weeds and landscape plants.

As far as actually putting IPM into practice, we think the maintenance directors and grounds keepers that were trained in the landscape class will have more impact in their school systems. This is mainly because their training was more extensive and technical than the training given to the custodians. However, those groundskeepers that attended the class without their supervisors were afraid they would be unable to make changes in their schools because they had no authority or power.

We realize now that in the structural IPM class, we probably concentrated too much on the wrong kind of information. We were hoping to train the custodians to perform basic structural pest management monitoring so they could become an extra pair of eyes for the maintenance directors. We didn't realize that most custodians don't have any time to do monitoring. Some told us that they barely have time to empty the trash, much less actually clean. They told us they have no time to notice pests or structural problems, and even if they knew what to look for, they don't have time to fill out work orders to record a problem and get it fixed. Perhaps we could have furthered the IPM cause more by teaching them why their job is so important to pest management, and how cleanliness is directly related to the level of pest infestation. Custodians also need more positive recognition for the hard work they do. They told us that they feel they are not respected and that no one ever speaks to them except to complain.

Training Materials for Maintenance Directors, Groundskeepers, and Custodians.

We prepared a notebook of about 150 pages for the landscape IPM class. It is an excellent reference for the four topics covered, and we hope the trainees continue to refer to it in their work. For the structural IPM training, we prepared four fact sheets and several monitoring forms, but custodians indicated that written materials were not the way to reach their group. Many of the custodians we met did not speak English as a first language. Some custodians suggested that a video might be more useful for them than fact sheets. We are still exploring ways to provide custodians with useful educational and reference material.

Recommendations on Training for Maintenance Directors, Groundskeepers, and Custodians

- In the beginning, concentrate training resources on the staff most closely associated with pest management.
- Include maintenance directors in the trainings. If staff are trained without their supervisors,

and supervisors are unaware of the new information, the staff may have difficulty obtaining permission to make changes or to experiment with new methods.

- Keep classes small, with a ratio of students to instructor of about 25:1.
- Provide food and drinks at each training session and announce this in the advertising and flyers for the workshop. This may seem trivial, but we have found that food can be an added incentive to come to class and can prevent lapses in attention because of plummeting blood sugar.
- Require pre-registration for classes to aid in planning for room set-up, duplication of training materials, and food. A class for which staff must sign up may be taken more seriously.
- Keep sessions to a maximum of three hours.
- Design classes as a combination of lecture/demonstration and field work that involves the direct and active participation of the attendees. People learn by doing and a “hands-on” workshop is much more engaging and stimulating than a simple lecture.
- Offer continuing education units for those staff who hold licenses.
- Give a brief explanation of available licensing opportunities, and encourage those without licenses to consider getting one.
- Include a section on pesticide laws, regulations, and safe use and handling. This is an important part of licensing requirements and will help to reduce risk.
- Include information on the Healthy Schools Act.
- If custodians are not involved in pest management and are stretched too thin to ever have time to monitor, give them information about why their job is so important to pest control and show them how to detect the presence of pests and the conditions that can lead to an infestation. Provide more technical information on structural pest management including pest biology, management techniques, and inspection guidelines to maintenance directors.
- Explore the possibility of including IPM information in CASBO (California Association of School Business Officials) trainings for custodians. The CASBO training begins with an explanation of the reasons to clean. IPM information would be appropriate in this section and could easily be incorporated. There may be other parts of their training where IPM principles could be included as well.
- Hand out certificates of completion to individuals during a short ceremony at the end of the class. This is a simple way to recognize the attention and participation of the attendees.

Parents

Attendance at both of our parent trainings was very low (13 to 18 people), and we expended considerable time and money getting these few people to attend. We ultimately concluded that even though there are some Marin parent and community groups very concerned about pesticide use in schools, the issue is not of great importance for the majority of parents in Marin County. This is either because they don't perceive pesticide use as a problem, don't have time to worry about it, or because they feel that other organizations and agencies are working on the problem, and therefore, as individuals they don't need to worry about it. We would not recommend repeating in Marin County the parent information night we developed, but in other counties, parents may want or need that kind of formal training.

We are still exploring the form parent training should take. Options include presentations at PTA meetings and writing short articles to be included in school newsletters or sent home in backpack mail. Although the parents in our school survey requested training on the health effects of pesticides, we feel it is important to

move the focus in schools away from pesticides and toward encouraging IPM. Everyone's time can be much more productively spent in learning how to implement IPM practices and thus avoid the use of pesticides. Parents need information about how to discourage pests in the classroom so they don't inadvertently make the situation worse, and they need to understand the pest management policy of their school.

If possible, we would also like to see schools take advantage of parent volunteers who are willing to help with pest management in some way. We understand that this proposition is not as easy as it sounds and requires thought, organization, and supervision; however, it can help the most vocal and active parents gain an understanding of the problems that face maintenance directors. Parents may not grasp the fact that maintenance directors have the same kinds of property maintenance issues homeowners do, but on a grand scale. In addition, a school is part of a neighborhood, and the school must coexist with all its neighbors, neighbors who may be worried about pesticide use, but also neighbors who place a high priority on aesthetics.

Teachers

We found it very difficult to gain access to teachers to give them training, even when we shortened our presentation to just 20 minutes. We understand from consultants working in other areas of California and the U.S. that finding time to train teachers has been troublesome for them also. The one presentation we did make to Marin teachers came as an invitation from a maintenance director who had taken the structural and landscape IPM training. We might have had more luck getting time with teachers by going through maintenance directors rather than superintendents.

From talking to a number of teachers, we know that they feel overwhelmed by meetings and special trainings. Several teachers told us not to be insulted if their colleagues were grading papers or doing other tasks during a training session. When we encountered resistance to our giving presentations at staff meetings, we began to explore other ways of providing teachers with information. We asked two separate teacher focus groups if they would keep and use fact sheets on IPM for the most common classroom pests. The response was mixed. Some said they had too much paper to deal with already and would probably throw them away; others said they would file the fact sheets and not remember where they were when they needed them. A couple of teachers suggested that we laminate the fact sheets and store them in the school office where anyone with a particular pest problem could quickly find them for reference. Another suggestion from teachers was to hang a poster about classroom cleanliness above the copy machine for them to read while they were waiting to copy materials. Teachers also suggested making a 10-minute video about classroom cleanliness to show at staff meetings.

The presentations we made to teachers outside Marin County were very successful. The teachers were mostly science teachers and teachers involved in school gardens. They seemed fascinated by the pest biology and alternative controls we discussed, and asked so many questions that it was hard to squeeze in all the information we wanted to provide.

Principals

Since principals seem to be the key to the cleanliness and upkeep of a school, we recommend that training or educational materials be designed for them that will provide information on the links between pest problems and cleanliness and upkeep. If regional or State conferences for principals exist, IPM experts or principals who make upkeep a priority can give presentations (suggested title: "The Power of the Principal to Create a Healthier School"). We also recommend introducing an incentive and recognition program for the best maintained school.

Superintendents, Local School Boards, County Board of Education, County Office of Education

We did not hold formal training for any of these groups, but we thought that the sustained personal contact we maintained with representatives of these groups was very successful in informing them about the importance of IPM, and making them feel that they, their schools, and their County are on the leading edge of a very important movement.

Objective III: Develop an Outreach Program

We have found that personal contact through meetings, letters, phone calls, email, and personal visits have the greatest effect on changing people's attitudes and encouraging experimentation with new ideas. This personal contact must be maintained diligently to foster the transition to new ways of thinking and new methods of managing pests.

We formed solid working relationships with maintenance directors, superintendents, and County school administrators. We frequently asked for their help and advice which they generously provided and which proved invaluable. We kept them informed of what we were doing in the project and gave them as much education about IPM as we could. We also made sure that our contacts understood that we were there to help them in whatever way possible. We feel we have earned their respect, and they now have begun to use us as resources.

Articles in newspapers, journals, and newsletters provide effective outreach. It is important to develop a list of media contacts and to allow enough lead time to get articles published. Our outreach component could have been even more effective had we started working on it earlier in the project.

A peer recognition program plays an important role in helping people to experiment with new ideas and new ways of doing things. Every opportunity should be taken to recognize and praise contributions to changing the pest management system, even if they are small.

Objective IV: Coordinate Demonstration Projects

From the people we interviewed and from the comments we received on the evaluations, the IPM Expo was a valuable and well-organized endeavor. People suggested that similar Expos be organized throughout the State, not only to publicize school IPM but also to help coordinate and standardize the information going to school staff and pest control professionals. Suggestions for improvement were focused on having more structure to the morning. One suggestion was to have short presentations in which school IPM practitioners could describe their most successful management techniques for particular pests, explain their monitoring program, or discuss their pest management protocols. Another useful suggestion was to conduct short tours around the school to look at specific on-site applications of IPM.

Summary and Conclusions

In our Model IPM plan for schools project, we have defined four stages in the process of helping schools to adopt and maintain a successful IPM program: 1) engaging people and motivating them to adopt IPM, 2) implementing an IPM program, 3) establishing opportunities for peers to exchange IPM information and receive recognition for their work, and 4) evaluating the program's initial and long-term success. This process may not always proceed in a linear fashion, and each stage will be ongoing.

During this first year of our project, we began the work of helping Marin County schools to adopt IPM. We were able to initiate all four stages of the process. Through our outreach, which included presentations, articles for publication, a web site, and many hours of personal contact, we have engaged a large group of people and involved them in our project.

Although we do not yet have a fully established IPM program in any one school in Marin County, we have conducted formal and informal IPM training for the school community, one of the first steps in implementing an IPM program. We assessed the state of pest management at three Marin schools so that we could design the training especially for the County. We held the workshops at a Marin school, and we incorporated examples of problems and IPM successes from Marin schools whenever possible. This clearly conveys the message to school personnel that someone is interested in their learning about IPM for their specific school site, thus making the training more significant to them.

We have included Marin school personnel as team members in the Pest Management Alliance which is working for change in pest management. This has given them a sense of pride in the role Marin County is playing to lead this change in the State. Our next step is to make certain the schools continue moving along the path to successful, sustainable IPM programs. The knowledge that someone is interested enough to monitor their progress can be a motivating force as well.

With the IPM Exposition at San Marin High in Novato, we began the process of facilitating an exchange of information among school personnel and the IPM community both in Marin County and across the State. The Expo brought together vendors of IPM products and services, school personnel, regulators, consultants, pest control professionals, academics, non-profits, and activists. On the local level, the assessment, training, and outreach portions of our project all provided a forum for information exchange and peer recognition in Marin County.

The Healthy Schools Act has captured the attention of most schools in California, and has had considerable influence in motivating schools to at least re-examine their pest management policy, if not adopt IPM. The Model IPM Plan for Schools project was planned long before the Healthy Schools Act was written, but we had the good fortune to begin our project as the Healthy Schools Act was being implemented. We helped publicize the new law and insure compliance in Marin County, and our project benefited from appearing even more timely than it already was.

The knowledge, techniques, products, and equipment are available to implement IPM programs in schools; however, school personnel lack training in IPM techniques, and need on-going technical assistance. IPM training allows school maintenance personnel to choose reduced risk practices with confidence and understanding, which makes it more likely that they will try alternatives.

In our work, we have also found that offering IPM training with a passionate instructor, even if only introductory training, is the most effective way to inspire a new audience with an abiding interest in adopting an IPM program. If money and time are limited, the most cost-effective program will be IPM training for maintenance directors and as many of their grounds and custodial staff that can be accommodated.

Ultimately, schools must be responsible for funding their own IPM training programs, but in the meantime they need assistance. DPR's School IPM Train-the-Trainer program is a good first step, but it is not realistic to think that a school could implement an IPM program based on a brief introductory training that is filtered through an IPM Coordinator who may have little understanding of IPM to begin with. We recommend that State funds be made available to provide a thorough school IPM training for maintenance directors and IPM Coordinators in each county in California.

We must also find a way to provide technical assistance to schools. We should inform them of the resources that are currently available, such as the County Departments of Agriculture, U.C. Cooperative Extension, U.C. Statewide IPM Project, the Bio-Integral Resource Center, IPM consultants, and the many fine books and publications on IPM. A number of maintenance directors have asked if we could provide a hotline for them to answer pest management questions. This seems unrealistic at the moment because of the amount of money and coordination that would be needed; however, an email list serve on which maintenance directors could ask questions and get fairly quick responses from experts or from other schools might be possible.

There are great challenges in the process of helping schools to adopt an IPM program; nevertheless, IPM makes sense. Through education, inspiring trainers, community support, and the requirements of the Healthy Schools Act, school personnel will discover that IPM is both a good management strategy and a way to significantly reduce the risk to pesticide exposure thus creating a healthier school environment.

Project Summary Form

Project Summary Form

1) Proposal Title

Model Integrated Pest Management Plan for Schools

2) Principal Investigator

Stacy K. Carlsen

3) Alternative Practices

Monitor

- structural deficiencies that lead to pest problems
- yellowjackets
- weeds
- birds
- rodents and other vertebrates including snakes and gophers
- turf health

Set Tolerance Levels (vary depending on site use and location and the people involved)

- ants
- cockroaches
- yellowjackets
- gophers
- weeds

Exclusion Techniques

- ants and cockroaches—repairing holes in structures, caulking cracks and crevices, weather stripping doors and windows, food storage in pest-proof containers
- yellowjackets—screening doors and windows, sealing holes and cracks in structure, weather stripping doors and windows
- gophers—wire mesh barriers
- rodents—repairing holes in structure and then keeping building in good repair, screening vents, eliminating access under structures, installing door sweeps and kickplates, sealing HVAC units, capping or screening drains, repairing sewer pipes
- birds—sealing HVAC units, eliminating ledges for roosting or loafing, screening areas with bird netting

Prevention

- ants and cockroaches—educating teachers, students, and staff about the connection between food, water, clutter, and pests, sanitation, keeping food out of the classroom, food storage in pest-proof

containers, limiting eating areas, using plastic liners in garbage cans, emptying garbage frequently and not leaving food garbage in a building overnight, repairing leaks

- yellowjackets—educating teachers, students, and staff about the connection between food and water and pests, keeping food out of the classroom, limiting eating areas, using plastic liners in garbage cans, emptying outside garbage cans after lunch, keeping garbage cans and dumpsters clean, using garbage cans with removable domed tops with vertical spring-loaded swinging doors
- rodents—educating teachers, students, and staff about the connection between food, water, clutter and rodents, keeping food out of the classroom, limit eating and food storage areas, storing food in rodent-proof containers, using plastic liners for garbage cans, emptying garbage before nightfall, keeping garbage cans and dumpsters clean, keeping lids on garbage cans and dumpsters, promptly removing pet wastes and fallen fruit and nuts, removing expanses of ivy, keeping vegetation 12 to 18 inches away from structures, trimming tree branches that allow rodent access to roofs, eliminating water sources
- birds—limiting outdoor eating, removing outside garbage promptly after lunch, redesigning buildings to eliminate roosting and loafing areas
- weeds—competitive plantings to exclude weeds, covering bare ground with mulch, redesigning landscapes and hardscapes to minimize weeds, changing irrigation practices to reduce weed growth, proper turf care to encourage healthy growth to exclude weeds

Barriers

- gophers—wire mesh barriers, fencing (1/2 to 3/4 inches mesh hardware cloth extending 2 feet underground and 1 foot above ground), creating buffer zones around preferred habitat by clearing a 15 foot strip of all vegetation, or planting a dense cover of trees or woody shrubs
- birds—bird netting
- weeds—horticultural fabric

Trapping

- yellowjackets—use traps away from areas where children congregate to avoid attracting more yellowjackets to the area, for baits use smelly canned cat food, canned mackerel, or liverwurst
- gophers—for low potential hazard areas, trap when populations are at their lowest (spring and fall); for medium potential hazard areas, trap every 1 to 3 days until population drops

Poison baiting

- ants—using bait stations with boric acid, hydramethylnon, fipronil
- cockroaches—using bait stations and gel baits with boric acid, hydramethylnon, fipronil
- yellowjackets—monitoring with traps on perimeter early in spring to determine potential population size (35-40 yellowjackets per trap in 4 hours triggers poison baiting), baiting with microencapsulated diazinon mixed with canned cat food or mackerel and placed in a hardware cloth bait stations

Other

- weeds—grazing animals, hand pulling, cultivation, mowing, steam, radiant heat, herbicidal soaps and essential oils
- gophers and rodents—installing owl boxes to encourage predation
- gophers—reducing broadleaf weeds (a favorite food) in turf, deep ripping a field to destroy population

4) Summary of Project Successes

We initially had considerable difficulty in convincing maintenance directors to attend training sessions and to allow their staff to attend. The school staff who did take the workshops were excited by what they learned and anxious to learn more. The greatest success of this project was showing maintenance directors in Marin County the value of high-quality IPM training. This resulted in their taking the initiative to seek additional funding for more countywide IPM training through budget allocations and joint powers agreements. The most useful insight gained during this project is that offering IPM training with a passionate instructor, even if only introductory training, is the most effective way to inspire a new audience with an abiding interest in adopting an IPM program.

5) Number of Participating School Districts	19	12) Number of Field Days	5
6) Total Acreage in Project	na	13) Attendance at Field Days	69
7) Project Acreage under Reduced Risk	na	14) Number of Workshops & Meetings	5 16
8) Total Acres of Project Crop	na	15) Workshop Attendance Meeting Attendance	125 106
9) Non-Project Reduced Risk Acres	na	16) Number of Newsletters	none
10) Number of Participating PCAs	1	17) Number of Articles (see text for details)	10
		18) Number of Presentations (see text for details)	9

11) Cost Assessment

The Alliance Team found it difficult to measure “cost” associated with reduced risk activities of the Model School IPM program. Since IPM is in fact an integration of many non-chemical management practices, it would be difficult to extract the labor costs of normal maintenance activities that may have a direct or indirect impact on pest populations. Examples of these include sanitation, structural repairs, or landscape activities, all of which have an effect on pest population, but could not be isolated as pest management expenses in our schools’ budgets.

The IPM training we conducted for maintenance directors, custodians, and groundskeepers was centralized, bringing school staff from across the County to learn from IPM industry experts. A total of twelve Marin school districts, represented by 68 staff members received training, certification, and continuing education credits. The cost of the IPM training was \$15,300 which included development. Had each of the attending school districts independently provided equivalent training programs, the total cost of training would have exceeded \$75,000.

There were specific examples of reducing pesticide use in the three schools under study. Between the fall of 2000 and the fall of 2001, Diazinon, Trimec, Turflon, Mecomec, Gallery 75, and Pre-M pesticides were

eliminated from use. This translates into reducing potential environmental impacts, including worker exposure, public exposure, and ground and surface water contamination. It also reduces the time spent by schools in pesticide training programs.

19) Other Outreach Activities

- Detailed pest management assessments conducted at three Marin County schools.
- First School IPM Expo held on July 18, 2001.
- School IPM Web pages added to the Marin County Department of Agriculture web site (www.co.marin.ca.us)

FOR OFFICIAL USE ONLY

Contract Number _____ Project ID _____

DPR ID# _____ Contract Manager _____

Appendices

Please Note: Materials in these appendices can be used free of charge. However, we ask that you give proper credit and inform us of where the materials are being used.

Marin County Department of Agriculture, Stacy Carlsen, Agricultural Commissioner

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Appendix A

- **Pest Management Assessment Tool**
 1. **Pest Management Summary Form**
 2. **Pesticide Use, Storage, and Disposal Checklist**
 3. **Pest Inspection/Sanitation Report**
 4. **Pest Proofing/Repairs Needed Inside**
 5. **Pest Proofing/Repairs Needed Outside**
 6. **Pest Control Survey for the School Community**

Pest Management Assessment Tool

The Pest Management Assessment Tool is meant to help maintenance directors, IPM Coordinators, consultants, or pest control operators understand the pest management system at a school. This includes the organizational structure, pest management policies, key pests and how they are managed, conditions conducive to pest problems, and attitudes toward pest management. The Tool can help the assessor remember what to look for and what questions to ask during an initial pest management assessment.

The Assessment Tool can also be used to train school personnel in monitoring procedures and can help remind the IPM Coordinator of the elements of an effective IPM program.

This Assessment Tool consists of a number of forms, all of which can and should be altered to fit your particular situation. Computer software exists that can help you create and modify forms. With an electronic scanner, you can scan in forms from other sources and modify them to fit your needs.

Forms:

1. Pest Management Summary Form
2. Pesticide Use, Storage, and Disposal Checklist
3. Pest Inspection/Sanitation Report
4. Pest Proofing/Repairs Needed Inside
5. Pest Proofing/Repairs Needed Outside
6. Pest Control Survey for people in the school community

Pest Management Summary Form

Date completed _____ By _____

Pest Management Summary Form	School:	School:	School:
	GENERAL SCHOOL INFORMATION		
School Address			
School District			
School Year, From: To:			
Superintendent Phone Number Address Address email No. of years in position			
Principal Phone number email No. of years in position			
PTA President email			
No. of Real Buildings			
No. of Portables			
	POLICY AND PLANNING		
IPM Policy for District?			
Pest management budget?			
Cost accounting for pest management?			
IPM Plans for key pests?			
Annual report on pest management?			
Approved pesticide list? Restricted pesticide list? Other pesticide lists?			

Pest Management Summary Form	School:	School:	School:
Policy on personal ownership/use of pesticide?			
In compliance with State worker health and safety requirements?			
What is the attitude toward trial and error and experimentation in pest management: Attitude of managers? Attitude of administration?			
Are pest prevention techniques used? Are they encouraged?			
Are pest management implications considered prior to new construction or building renovation?			
Are pest management implications considered prior to new landscaping or landscaping renovation?			
	TRAINING		
Training in pesticide safety, use, and disposal?			
Training in pest management is required? How much? IPM training included? How much? Who provides training? Continuing education units offered?			
Opportunities for pursuing State licensing (QAC, QAL)?			
	MONITORING/RECORD KEEPING		

Pest Management Summary Form	School:	School:	School:
How often and under what circumstances is the campus inspected for pest problems or conditions conducive to pests?			
Monitoring program in place for key pests?			
Monitoring data recorded? How: By hand? Computerized? Where are records kept?			
How are pest sightings or complaints about pests relayed from teachers and admin. staff to pest management staff? Are sightings and complaints recorded?			
Are pest control treatments evaluated for effectiveness? Are pest control strategies modified to reflect the evaluation?			
COMPLIANCE WITH THE HEALTHY SCHOOLS ACT (AB2260)			
School designee/IPM Coordinator selected? (Include name and other information below under "Organizational Structure for pest management.")			
Annual pesticide use notification letter sent?			
Number of people on registry?			
People on registry notified for each pesticide application (including those of contractor)?			
Pesticide applications posted?			
ORGANIZATIONAL STRUCTURE FOR PEST MANAGEMENT			

Pest Management Summary Form	School:	School:	School:
Pest management activities carried out by district staff or school staff?			
IPM Coordinator Address Address Phone number Fax number email No. of years in position Licenses held			
School Designee (for purposes of the Healthy Schools Act) Address Address Phone number Fax number email No. of years in position Licenses held			
District Supervisor for Maintenance (if different from above) Address Address Phone number Fax number email No. of years in position Licenses held			
Other Important District Managers			
Main Groundskeeper Phone number No. of years in position Licenses held			

Pest Management Summary Form	School:	School:	School:
Total No. of Grounds staff			
No. holding licenses			
Head Custodian			
Phone number			
No. of years in position			
Licenses held			
Total No. of Custodians			
No. holding licenses			
Outside Contractors			
Address			
Address			
Contact name			
Phone number			
Outside contractors provide district/school with periodic reports?			
What frequency?			
Work orders generated by			
Work orders approved by			
Pesticide use records stored:			
FOOD PREPARATION/SANITATION			
Cafeteria/Kitchen?			
Where do children eat?			
Food Prep on Site?			
Food in classrooms?			
Pets in classrooms?			
Lockers in school?			
Sanitation for lockers?			
Dumpster pickup schedule			
Dumpster clean?			
Lid on dumpster?			
LANDSCAPING			

Pest Management Summary Form	School:	School:	School:
No. and size of fields			
No. and size of lawns			
Other landscaping of concern			
KEY PESTS			
Insects in and around Structures			
Primary pest Pesticide(s) used Other control methods			
Secondary pest Pesticide(s) used Other control methods			
Other/Comments			

Pest Management Summary Form	School:	School:	School:
Conditions conducive to insect pests. (list all)			
Vertebrates (other than birds)			
Primary pest Pesticide(s) used Other control methods			
Secondary pest Pesticide(s) used Other control methods			
Other/Comments			
Conditions conducive to vertebrate pests. (list all)			
Bird pests Pesticide(s) used Other control methods			
Other/Comments			
Conditions conducive to bird pests. (list all)			

Pest Management Summary Form	School:	School:	School:
Other structural pests Pesticide(s) used Other control methods			
Turf Pests (other than weeds)			
Primary pest Pesticide(s) used Other control methods			
Secondary pest Pesticide(s) used Other control methods			
Other			
Conditions conducive to turf pests. (List all)			
Weed Pests			
Primary weed Herbicide(s) used Other control methods			
Secondary weed Herbicide(s) used Other control methods			
Tertiary weed Herbicide(s) used Other control methods			
Additional weed(s) Herbicide(s) used Other control methods			

Pest Management Summary Form	School:	School:	School:
Conditions conducive to weeds. (List all)			
Other landscaping pests Pesticide(s) used Other control methods			

Pesticide Use, Storage, and Disposal Checklist

General

- Pesticides used in school are registered in California.
- Copy of each appropriate label is available at use site.
- Applicators using restricted materials are licensed or certified to apply the material or under the direct supervision of someone who is.
- Records are kept of pesticide use. Records must include the following to comply with the Healthy Schools Act:
 - date and place of application
 - amount used
 - product names
 - active ingredient(s)
 - manufacturer's name
 - U.S. Environmental Protection Agency's product registration number.
- Pesticide use records kept for 4 years in an area accessible to the public.

Training

- School keeps written records of applicator training.
- Pest management personnel receive training in IPM practices.

Applicators are trained in at least the following:

- Summary of Hazard Communication Program
- The location of the completed *Hazard Communication for Employees Handling Pesticides in Noncrop Settings* (Pesticide Safety Information Series N-8 from the Department of Pesticide Regulation or your County Agricultural Commissioner)
- Chemicals present at the workplace
- Location of Material Safety Data Sheets
- Interpreting information on Material Safety Data Sheets and pesticide labels
- Health hazards associated with the chemicals present at the workplace
- Procedures to protect against hazards (e.g., personal protective equipment, proper use and handling, safety requirements)
- Routes pesticides can enter the body and the signs and symptoms of pesticide over-exposure
- Emergency first aid and how to obtain emergency medical care
- Environmental concerns such as drift, runoff, and wildlife hazards
- Applicable regulations

Equipment

- Equipment in good repair and safe to operate.
- Equipment for mixing, loading, transferring, or applying pesticides is inspected before each day of use.

Emergency Plans

- List of emergency phone numbers in vehicles and/or an accessible area near a phone.
- List of first aid procedures in vehicles and/or at use sites.
- Name, address, and phone number of facility at which medical care is available is prominently posted in vehicles and/or at use sites.

Storage and Disposal

- Pesticides with signal words "Danger" or "Warning" stored in locked area that is dry, separate from food and feed, and away from children and pets.
- Sign reading "Danger: Poison Storage Area. All unauthorized persons keep out." posted on storage area.

- Pesticides with signal word “Caution” stored in dry areas away from children, preferably under lock and key.

Pest Inspection/Sanitation Report

Date _____ School _____

Building # / Location _____

Inspector _____ InspectionType Initial Quality Control Routine

Evidence of Infestation(s)

Pest	Location	Pest	Location
Ants		Fleas	
Cockroaches		Stored Prod. Pests	
Mice		Pigeons	
Rats		Other	

Sanitation Survey

FOOD PREPARATION	YES	NO	RECEIVING	YES	NO
Equipment clean			Floors clean		
Appliance drip pans clean			Area neat and tidy; no clutter		
Floors clean			Empty boxes stored in cold storage		
Floor drains clean			Empty boxes stored away from kitchen		
Sink drains clean			PUBLIC AND STAFF AREAS		
Counters/Tables clean			Restrooms clean		
Food stored pest-proof containers			Plumbing in good repair; no leaks		
Perishables stored in refrigerator			Locker room clean		
Garbage removed daily at end of day			Locker room free of food and food waste		
Spillage cleaned regularly			Employee lounge clean		
Floors and counters dry; no standing water			Food stored properly in lounge		
Plumbing in good repair; no leaks			Food stored properly in classrooms		
Windows/doors screened			Trash removed daily before end of day		
Gaps around/under doors or windows repaired			Janitorial closet clean		
Pest proofing needed			Pest Proofing needed		
STORAGE AREAS			EXTERIOR		
Floors clean			Dumpster/garbage cans cleaned weekly		
Floor drains clean			Dumpster/garbage cans have lids		
Food stored in pest-proof containers			Lids closed on dumpster/garbage cans		
Recyclables cleaned before storing			Garbage area downwind from kitchen		
Spillage cleaned regularly			Dumpster/Garbage area clean		
Items stored 6" to 8" off floor			Garbage removed at least weekly		
Items stored 12" to 18" away from wall			Pet waste removed daily		
Stock rotated			Loading dock clean		
Area neat and tidy; no clutter			Gaps under/around doors repaired		
Pest proofing needed			Area is trash- and weed-free		
OTHER			Area is dry; no standing water		
			Pest proofing needed		
			OTHER		

Comments/Recommendations _____

Pest Proofing/Repairs Needed Inside

Date _____

Inspector _____

School _____

Building # / Location _____

For each repair, specify location and action needed. Draw a floor plan on the reverse side of this form to clarify locations. State priority for each work item.

- ? Seal holes in wall around pipes, cables, and wires
- ? Seal cracks and crevice with caulk or paint
- ? Seal other holes 1/4" or larger
- ? Fix leaky plumbing
- ? Doors ? Repair ? Replace ? Weather-strip ? Add kickplate
- ? Other _____
- ? Correct excessive moisture problems
- ? Remove clutter
- ? Bring order to storage rooms/closets
- ? Store rodent nesting material (fabric, paper, rug scraps, plastic, insulation) in rodent-proof containers
- ? Clean drains
- ? Screen drains
- ? Cap drains in basement floors
- ? Store human and pet food in pest-proof containers
- ? Improve sanitation
- ? Dispose of insect- or rodent-infested goods
- ? Remove fecal matter (rodents, bats, birds)
- ? Sanitize animal droppings
- ? Investigate secondary pest potential from rodent infestation (e.g. fleas, mites)

Pest Proofing/Repairs Needed Outside

Date _____

Inspector _____

School _____

Building # / Location _____

For each repair, specify location and action needed. Draw a building plan on the reverse side of this form to clarify locations. State priority for each work item.

- ? Cut vegetation back from building walls at least 18"
- ? Remove ivy or other vines from sides of buildings or nearby trees
- ? Trim back tree branches that touch or rub against building
- ? Seal /repair air conditioning units
- ? Seal holes in wall around pipes, cables, and wires
- ? Seal other holes 1/4" or larger
- ? Doors ? Repair ? Replace ? Weatherstrip ? Screen
 ? Other _____
- ? Windows ? Repair ? Replace ? Weatherstrip ? Screen
 ? Other _____
- ? Repair roof
- ? Move compost into rodent proof container
- ? Fix leaking irrigation
- ? Eliminate standing water
- ? Improve drainage
- ? Screen drains
- ? Bring order to storage sheds
- ? Store rodent nesting material (fabric, paper, rug scraps, plastic, insulation) in rodent-proof containers
- ? Store grass seed and pet food in rodent-proof containers
- ? Remove debris, lumber, or rock piles
- ? Move firewood piles as far away as possible from structure
- ? Cut grass or weeds
- ? Remove fallen fruit or nuts
- ? Remove fecal matter (pets, rodents, bats, birds)
- ? Sanitize animal droppings

? Investigate secondary pest potential from rodent infestation (e.g. fleas, mites)

Pest Control Survey for the School Community

Dear Superintendents, Principals, Teachers, School Staff, School Board Members, and Parents,

We are making a comprehensive assessment of your school pest management program. As a part of this process we are gathering data to better understand the roles and priorities of those involved so we can best meet your needs and most effectively allocate resources.

We would appreciate your taking a few minutes to fill out the attached survey. Any additional comments are welcome.

Please return your survey to _____ by _____.

Sincerely,

Pest Control Survey

School: _____ District: _____

Position: _____ Name (Optional): _____

NOTE: We may want to use quotes from your written comments in our report. To give permission to publish your comments (your name would be withheld), please sign below.

You have my permission to reprint my written comments.

Signature: _____ Date: _____

I. Current Pest Management Policies

1. Pest management activities are carried out primarily at (Circle one)
The district level The school site level Don't Know
2. Does your school or district have a written policy concerning pest control?
(Circle one.) Yes No Don't Know
If you answered "no" or "don't know" to question #2, skip to question #6
If you answered "yes," continue below with question #3.
3. Does the policy include the use of integrated pest management (IPM)?
(Circle one.) Yes No Don't Know
4. If IPM is being used, does your school or district have a designated IPM Coordinator?
(Circle one.) Yes No Don't Know Not Applicable
5. Does your school or district have a community-based IPM advisory group?
(Circle one.) Yes No Don't Know Not Applicable
6. Does your school or district have a written plan or handbook detailing pest management activities?
(Circle one.) Yes No Don't Know
7. Does your school or district have a list of materials (e.g. pesticides, disinfectants) approved for pest control?
(Circle one.) Yes No Don't Know
If "yes," does your school or district post the list in a public place?
(Circle one.) Yes No Don't Know
8. Does your school or district keep a registry of chemically sensitive or special concern students, parents, or staff to notify prior to pesticide applications?
(Circle one.) Yes No Don't Know
If "yes," how is this special notification done?
(Circle one.) Note home Phone call Other _____ Don't Know
9. Are notices posted around the application site prior to and/or after pesticide applications?
(Circle one.) Yes No Don't Know

II. Organizational Structure

1. What is your pest management role? (Rank all that apply: 1=primary role, 2=secondary role, etc.)
 Occupant (impacted by pest management actions)
 Pest Management Technician (implement pest management practices)
 Monitor (notify someone of pest presence)
 Manager (decide how to allocate resources to pest management needs)
2. How are pest control activities for food services, structures, and grounds managed?
(Circle one.) Separately Together Don't Know
3. Who is responsible for monitoring and/or notification of pest presence? (Check ALL that apply.)
 District pest management technicians
 Exterminators/pest control companies contracted by the school
 Grounds crew
 Custodians
 Maintenance staff
 Parents
 Principal
 Administrative Staff
 Teachers
 Students
 Other _____
 Don't know
4. Who is responsible for deciding what actions to take (and when to take them) after a pest has been discovered or reported? (Check ALL that apply.)
 District pest management technicians
 Exterminators/pest control companies contracted by the school
 Grounds crew
 Maintenance
 Custodians
 Principal
 Other _____
 Don't know
5. After decisions have been made on what to do about the pest, who implements these decisions? (Check ALL that apply.)
 District pest management technicians
 Exterminators/pest control companies contracted by the school
 Grounds crew
 Maintenance staff
 Custodians
 Other _____
 Don't know

6. Who is responsible for recording which actions were taken against the pest? (Check ALL that apply.)
- District pest management technicians
 - Exterminators/pest control companies contracted by the school
 - Grounds crew
 - Maintenance staff
 - Custodians
 - Principal
 - Administrative Staff
 - Other
 - Don't know
7. Who is responsible for monitoring the effectiveness pest control actions? (Check ALL that apply.)
- District pest management technicians
 - Exterminators/pest control companies contracted by the school
 - Grounds crew
 - Maintenance staff
 - Custodians
 - Principal
 - Teachers
 - Administrative Staff
 - Other
 - Don't know

III. Control Methods

1. How would you rate the overall pest management program in your school or district?
(Circle one.) Excellent 1 2 3 4 5 poor
2. How do you perceive the health risk from pests in your school or your district?
(Circle one.) High Medium Low
3. How do you perceive the risk from pesticide and/or herbicide exposure in your school or district?
(Circle one.) High Medium Low
4. Check the pests you consider the most significant at your school.
Indoors (Choose 3): Ants Roaches Fleas Head lice Spiders Termites Mice
 Rats Other _____
Outdoors (Choose 3): Ants Yellow jackets or bees Gophers Mice Rats
 Weeds Plant diseases Other _____
5. When are pesticides and/or herbicides applied? (Check ALL that apply.)
- Only after school hours/on weekends/over vacations
 - During school hours
 - Both during and after hours
 - To unoccupied areas during school hours
 - Varies depending upon need
 - Don't Know
6. If ants invade your classroom/office, how do you proceed? (Check only one.)
- Notify appropriate people of problem and wait for help.
 - Notify appropriate people of problem and take action on your own.
 - Take action on your own without notification.

Other_____

7. If you take action on your own, what are your reasons? (Check all that apply)
- School policy allows it
 - Response to ant problems from pest management personnel is inadequate
 - Response to ant problems from pest management personnel takes too long
 - Other_____
 - Not Applicable
8. When you take steps to solve ant problems yourself in your classroom/office, what do you do? (Check ALL that apply.)
- Seal holes where ants are entering the room
 - Apply an aerosol spray
 - Empty garbage/clean up items attracting ants
 - Set out ant bait stations (please list brand names:_____)
 - Clean up ant trail
 - Other_____
 - Not Applicable

IV. Training

1. Have you received training on how your school's or your district's pest management policies work?
(Circle one.) Yes No Don't Remember
2. Have you received information on how your school's or your district's pest management policies work?
(Circle one.) Yes No Don't Remember
3. If you have received training or information, by whom was it provided? (Check ALL that apply.)
- District Maintenance Personnel
 - Principal
 - Private Consultant
 - Other
 - Don't Remember
4. Do you feel teachers should be permitted to put out insecticidal bait stations for ants and cockroaches?
Circle one: Yes Yes, with training No Don't Know No Opinion
5. If you are a teacher, would you be willing to take 10 hours of pesticide safety training per year in order to be able to use baits stations for ants and cockroaches in your classroom?
(Circle one.) Yes No Not Applicable
6. If you were to receive information about pest management, which of the following topics would be most important to you? (Rank All that apply. 1=most important)
- Health effects of pesticides
 - Pesticides and pest management practices used at your school
 - Safety risks from pests
 - How to identify and prevent pest problems.
 - Non-chemical pest management practices you can implement
 - Pesticide safety training
 - Other_____

7. How would you like the information presented? (Check ALL that apply.)
 Printed fact sheets
 Web site/links
 Training sessions
 Other _____
8. If you checked "Training sessions" above, how would you prefer to schedule them?
(Please indicate the top two.)
 Two sessions of 2 hours each on different days
 One session of 4 hours
 Two sessions of 4 hours each on different days
 One session of 8 hours (full day)
9. Which factors would be most likely to prevent your school or district from providing training on pest management to all school or district employees? (Check ALL that apply.)
 Cost
 Scheduling problems
 Lack of interest on the part teachers and staff to receive training
 Lack of interest on the part of the administration to provide training
 Other _____
10. Are continuing education credits an incentive for attending training?
(Circle one.) Yes No
11. Which of the groups below should receive information or training on aspects of pest management?
(Check ALL that apply)
 School Board members
 Superintendents
 Principals
 Teachers
 Administrative staff
 Students
 Parents
12. Which topics should be part of the training for the groups you checked above? (Check ALL that apply.)
 How the school's pest management policy works
 How to report pest problems.
 How to prevent pest problems in the office and classroom.
 How to inspect your classroom or office for pest presence.
 Non-chemical alternatives for solving major pest problems.
 Other _____
13. Check the group to which you belong:
 School Board
 Superintendents
 Principals
 Teachers
 Administrative staff
 Parents

14. What is the best format for delivering information or training on least-toxic pest management to the group you represent? (Choose only one.)

- Classroom-type training sessions
- Informal talks at staff meetings
- Fact Sheets
- Other _____

15. When is the best time to offer training for to your group?

- The week before school starts
- The week after school ends
- Winter vacation
- Spring break
- Over the summer
- Other _____

16. Do you include pests and pest control in your science curriculum?

(Circle one.) Yes No Don't Know

V. Changing Pest Management Practices

1. In your view, which of the following would be the most compelling reasons to change your current pest management program? (Please rank, 1=most compelling)

- Reduce time spent managing pests
- Reduce liability associated with pest management
- Reduce risk to staff
- Reduce risk to students
- Meet community concerns
- Reduce cost of pest management
- Increase efficiency and oversight of pest management operations

2. Which of the following factors do you think limits the use of least-toxic pest control at your school or in your district? (Please rank, 1=most limiting)

- Availability of low-risk materials/practices
- Efficacy of low-risk material /practices
- Difficulty in comparing risks of different chemical and non-chemical practices
- Anticipated increase in the cost of materials
- Anticipated increase in the cost of labor
- Compromise to cosmetic standards
- Lack of technical information and/or support
- Don't Know

3. Do you feel under pressure from community/parent groups to change your school's or your district's pest management program?

(Circle one.) Yes No

Comments?

4. If you were required to change your activities to improve the current pest management system, please rank which you would be willing to change, from first to last (1=first).
- Take responsibility for improved sanitation in my own office/classroom
 - Take responsibility minor structural improvements (such as caulking) in my office/classroom
 - Change my cosmetic standards for the school site
 - Tolerate more pesticides
 - Tolerate more pests, as long as they were not causing health or economic damage
 - Participate in more training
 - Increase the budget
 - None of the above
 - Other _____
5. Do you have recommendations for improvement to the current pest management system? (Please use a separate sheet if necessary. We appreciate your comments.)

Appendix B

- **Assessment Of Current Landscape Pest Management Practices at Three Marin County Schools**
- **Assessment Of Current Structural Pest Management Practices at Three Marin County Schools**
- **Pest Management Perceptions and Needs Assessment**

Assessment Of Current Landscape Pest Management Practices at Three Marin County Schools

MODEL INTEGRATED PEST MANAGEMENT PLAN FOR SCHOOLS

ASSESSMENT OF CURRENT LANDSCAPE PEST MANAGEMENT PRACTICES

AT THREE MARIN COUNTY SCHOOLS:

Bacich Elementary School, Miller Creek Middle School, and San Marin High School

Report prepared by: Michael Baefsky
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Inspection dates: October - November 2000
Inspected by: Michael Baefsky

HISTORY OF LANDSCAPE PEST CONTROL

Bacich Elementary School, located in the city of Kentfield, is in the Kentfield Unified School District. A private contractor carries out routine care of the turf, including athletic field mowing, spraying, and fertilizing. Chemical control has been the tool of choice for treatment of weeds on the athletic field, and in most other areas in the past. Parent concern about pesticides in schools has led the District to adopt an IPM policy. The last reported pesticide application was on April 7, 1999. Since then, the school has had a "No Chemical" policy, that has excluded the use of all fertilizers and outdoor pest control chemicals, except for pheromones used in yellowjacket traps. Recently their athletic field was fertilized using a synthetic fertilizer. The District is planning to test a series of non-chemical and chemical weed control treatments on this school site in response to parent concern about pesticide use and safety.

Miller Creek Middle School, located in Marinwood in unincorporated Marin County, is in the Dixie School District. One groundskeeper, who holds a qualified applicator certificate, handles outdoor pest problems. Pest problems have been treated using primarily chemical and physical (mowing) methods.

San Marin High School, located in the city of Novato, is in the Novato Unified School district. All pest problems are handled in-house by a groundskeeper. Cultural, physical, and chemical methods are used for controlling pests on site.

Common to all three sites were the following items:

- Key landscape pests
The main landscape pests reported at all three sites were weeds and yellowjackets.
- Record keeping
Records on pesticide use are kept at the district level for all three schools. Non-chemical treatments and landscape maintenance activities are not recorded.
- Awareness of pest problems

Grounds staff are aware of their major pest problems and have worked out strategies for dealing with them.

- Complaint handling
Pest management at these three schools is not driven by complaints from teachers and staff. Only occasional complaints are logged.
- Sources for pest control information
All three sites reported using the Agricultural Commissioner's Office and Cooperative Extension as sources of information on pest control.
- Training needs
All three schools appear to have training needs in the following areas:
 - Weed IPM
 - Monitoring
 - Treatment Thresholds
 - Non-chemical weed control methods
 - Yellowjacket IPM
 - Turfgrass IPM

A hands-on, workshop-style training program that addressed these topics could be structured as follows, with the following order preferred:

- Why and What is IPM - focus on biology, ecology, monitoring and treatment thresholds.
- Weed IPM - focus on non-chemical methods.
- Yellowjacket IPM - showcase successful program
- Turfgrass IPM - focus on managing weeds through cultural methods

It would be best to deliver the training to small groups of groundskeepers and their supervisors, with a ratio of students to instructors not exceeding 12:1. Two-hour maximum for each session is recommended.

EVALUATION OF CURRENT PEST MANAGEMENT PRACTICES

Bacich Elementary: Overview

No pesticides or herbicides are used at this school, and a number of components of an IPM program are already in place

- Sanitation, a preventive measure for many pests, is taken seriously at this school.
- Yellowjackets are being monitored with pheromone traps (Sterling®).
- Mowing is used to some extent for weeds in areas beyond fencelines. Mulch is being used effectively in several tree plantings.
- Organized sports are prohibited on the turf from December through March to allow the field to rest and recover.
- Turf is aerated once a year and fertilized two to four times per year.

Bacich Elementary: Key Pests

WEEDS

- Intermediate amount (5-15%) of white clover (identified by staff as key weed) growing in athletic field.
 - Athletic field is in a condition conducive to weed success: 25 % bare soil and a high percentage (50%) of turf that appears nutrient-deficient.

- Many invasive, undesirable plants are growing outside of school fencelines. If weeds in areas surrounding the school are not managed, the result will be a build-up of the weed seed bank in bare soil areas adjacent to fencelines.
- Some planted beds had many germinating weeds on bare soil, others had few weeds.
- Areas of bare, compacted soil were observed between school buildings. The plants in these areas were not thriving due to this condition, but because of compaction, weeds were not observed in these areas.

Weed Management, Current Practices

- Until approximately nine months ago, weeds were sprayed with a variety of herbicides.
- Mowing is used in areas beyond fencelines.
- Mulch is being used in several plantings. Shredded redwood bark on top of geotextile fabric is the type observed. Applications appear to be very recent.
- A thin layer of compost was observed on one mixed (new) planting bed. This practice appears to be encouraging weed germination and growth.
- Turf is aerated once a year and fertilized two to four times a year using synthetic fertilizer.
- No organized sports on turf from December through March.

Outside Contractor for Landscaping

Cagwin & Dorward
P.O. Box 1600
Novato CA

Contact: Dan Sheehy, Phone: 415-892-7710

Until nine months ago, Cagwin & Dorward was routinely spraying the school grounds. Now they manage the turf without pesticides, although chemical fertilizers are applied two to four times per year.

YELLOWJACKETS

- Because trash cans are without lids, yellowjackets are attracted to the containers and can easily use them as a food source,.
- Bees and yellowjackets were observed visiting flowering plants in planter boxes next to outdoor eating area.

Yellowjacket Management, Current Practices

- Three traps baited with pheromone were observed on a perimeter fence near creek and parking lot, approximately 50 feet away from closest eating area.
- Food debris containers are emptied and washed daily; trash containers are emptied as needed; recycling containers are emptied once a week.
- The outside student lunch area is periodically steam cleaned or swept.

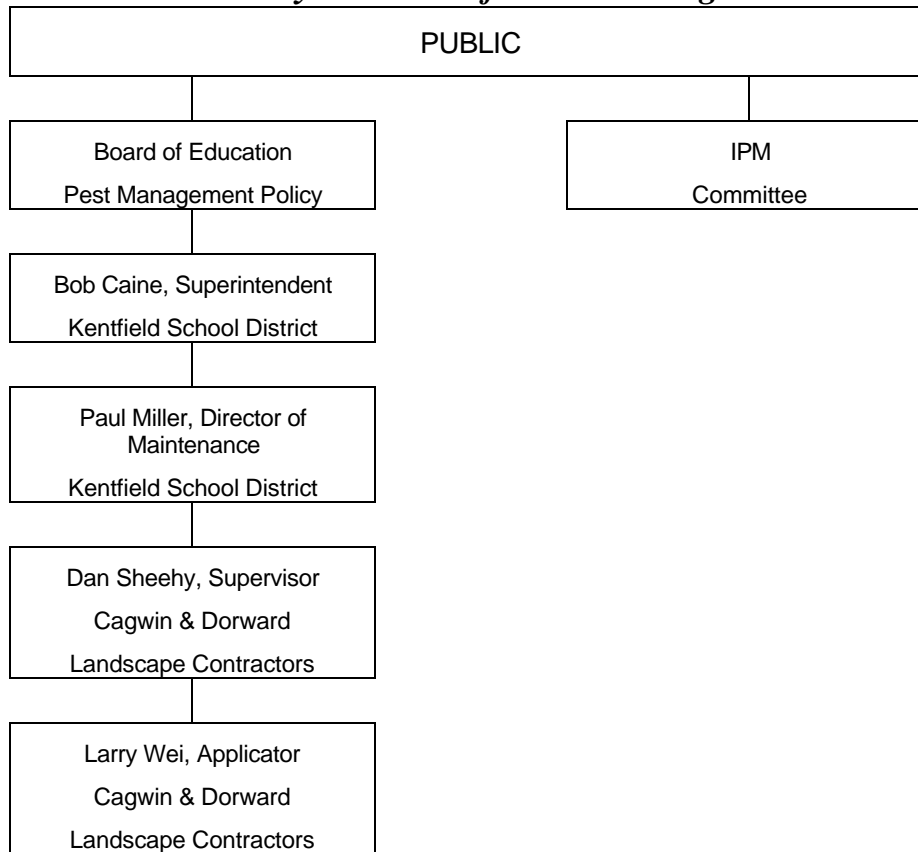
Bacich Elementary: Record Keeping

Pesticide use records are kept and stored by the outside contractor.

Bacich Elementary: Tolerance for Key Pests

<u>KEY PEST</u>	<u>TOLERANCE LEVEL</u>	<u>DETERMINED BY</u>
WEEDS	Low	Staff
YELLOWJACKETS	Low	Staff

Bacich Elementary: Structure for Pest Management Decision Making



RECOMMENDATIONS

Bacich Elementary: Recommendations on Pest Management Policy

We suggest the following:

- Use treatment thresholds for key pests.
- Monitor pest populations and record observations.
- Increase tolerance of weeds, increase intensity of plantings, or increase management in areas of concern.
- Continue restricting pesticide use in areas of student activity.
- Require outside contractor to keep thorough records not only of pesticide use, but also of other maintenance activities and non-chemical pest management actions.
- Keep pest management records for the school on site as well as at the district office.
- Keep on site the MSDS's of pesticides used on campus. Store them in a public place in a highly visible container for easy public access.
- Allow targeted use of least toxic pesticides when student health and safety are threatened by pest problem.

Bacich Elementary: Recommendations on Additional IPM Components for Key Pests

ADDITIONAL IPM COMPONENTS FOR WEED MANAGEMENT

Planted areas, non turf

- Use green flaming on young weeds during the rainy season.
- Use geotextile covered with four inches of mulch in appropriate areas. Eradicate weeds prior to placement.
- Monitor areas bi-monthly during growing season and remove weeds by hand. Cover areas with at least four inches of mulch to suppress additional germination.

Turf

- Overseed bare and weedy areas with matching turf type to keep a dense stand.
- Use grasscycling (this entails using special mowers to cut clipping finely and then leaving clippings on turf) to reduce fertilizer needs and increase vigor.
- Increase frequency of turf aeration to two to four times per year.
- Design fertilization program based on laboratory soil test.
- Monitor turf monthly during growing season. Establish treatment thresholds for each weed species based on health and safety.
- For white clover, consider the following:
 - Lower mower height to remove flowers
 - Increase turf vitality and competitiveness (see above: grasscycling, aeration, fertilization).
 - Overseed bare areas (see above).
 - Test pH and fertilize to acidify the soil in order to decrease clover vigor. Consult a professional to determine appropriate fertilizer for any particular time of the year.

ADDITIONAL IPM COMPONENTS FOR YELLOWJACKET MANAGEMENT

- We strongly recommend using covered trash cans.
- Use plastic liners in all trash cans and empty food debris containers immediately following lunch (remove plastic liners each time the containers are emptied).
- Any containers for recyclable materials should be emptied after lunch and materials stored in covered containers until weekly pickup.
- Clean and remove trash cans from eating area after lunch so the area does not become a permanent feeding station for yellowjackets.
- Select other sites on campus for permanent garbage cans. These permanent containers should have swinging lids to prevent yellowjacket access. It will be necessary to educate children on the importance of putting garbage *inside* the can.
- Consider replacing flowering plants in planters near eating area with non-flowering plants.
- Monitor perimeter fences and outdoor eating areas to spot elevated yellowjacket activity. Search for nests on campus grounds and destroy using least-toxic products. (Consider using mint oil products.)

If yellowjackets become a *serious* problem, we suggest exploring the possibility of following the IPM protocol for yellowjacket management:

- In early spring, monitor yellowjacket population with traps (Yellowjacket Inn®) baited with tuna-flavored cat food.
- When catches exceed 35 to 40 yellowjackets per trap in a 4-hour period, have an outside contractor institute poison baiting immediately (using microencapsulated diazinon in fish-flavored cat food).
- Bait should be changed at least twice weekly to ensure freshness and attractiveness of bait. Consider a daily bait change, especially if yellowjacket populations are high.
- Baiting should be necessary only during a short period (perhaps three weeks) in spring.

**SUMMARY OF ALTERNATIVE CONTROLS FOR KEY PESTS
AT BACICH ELEMENTARY SCHOOL**

<u>KEY PEST</u>	<u>ALTERNATIVE CONTROLS</u>	<u>GUIDELINES</u>
WEEDS (non-turf, planted)	Green Flaming	Works best during the rainy season and on young weeds.
WEEDS (non-turf, planted)	Geotextile & 4" of mulch	Eradicate weeds prior to treatment.
WEEDS (non-turf, planted)	Monitor bimonthly during growing season	Treat germinating weeds manually, then apply at least 4" of mulch to suppress additional germination.
WEEDS (in turf)	Overseed existing bare & weedy areas and any bare spots that occur from weed removal.	Match turf type in area
WEEDS (in turf)	Use grasscycling	This will reduce fertilizer needs.
WEEDS (in turf)	Aerate	Aerate 2 to 4 times per year.
WEEDS (in turf)	Fertilize	Fertilize based on professional soil testing.
WEEDS (in turf)	Monitor bimonthly during growing season	Establish treatment thresholds for each species based on health and safety.
WHITE CLOVER (in turf)	Mow lower as soon as bloom begins. Continue till bloom ends.	This is to remove flowers and reduce danger of stinging wasps or bees.
WHITE CLOVER (in turf)	Overseed, fertilize, and aerate turf. Use grasscycling.	This will improve the competitiveness of desirable turf.
WHITE CLOVER (in turf)	Fertilize to acidify soil and decrease clover vigor.	Test pH and consult professional on appropriated type of fertilizer for any given time of the year.
YELLOWJACKETS	Monitor with traps starting in early spring. Use poison baiting if population increases to serious proportions	If and when trap catches reach 35-40 yellowjackets per 4-hour period in early spring-summer, have outside pest control company do baiting.
YELLOWJACKETS	Restrict yellowjacket access to food debris.	Use covered garbage cans.
YELLOWJACKETS	Empty trash cans immediately following lunch.	Use plastic liners in all garbage cans. Replace liners after emptying garbage.
YELLOWJACKETS	Clean and remove trash cans from eating area after lunch.	This is to prevent area from becoming a permanent feeding station.
YELLOWJACKETS	Select other sites on campus for permanent garbage cans. Use cans with swinging lids.	Educate children and staff on the importance of putting garbage <i>inside</i> the can.
YELLOWJACKETS	Empty trash cans on weekends, as needed.	
YELLOWJACKETS	Change plantings next to eating area so as not to attract stinging wasps or bees.	Use non-flowering plants.
YELLOWJACKETS	Monitor perimeter and outdoor eating areas to detect elevated yellowjacket activity. Destroy nests found on campus.	Use least-toxic products on nests, e.g. mint oil products.

RECORD KEEPING OPTIONS

Record keeping is important because written records are the memory of an IPM program. They form the basis for making decisions on the most sensible allocation of resources; allow information to be transferred easily and accurately from one employee to another, especially when employees leave the system; and they allow staff to learn more about the nature of various pest problems and which treatments do or do not work. Written records can satisfy public interest in a school's pest control practices and document success stories to share with colleagues and the public.

- Records should be kept on landscape maintenance practices including irrigation, fertilization, aeration, and mowing schedules. Pest monitoring records should also be kept along with any chemical *and* non-chemical pest management activities.

COSTS ASSOCIATED WITH ADOPTING RECOMMENDATIONS

1. Mulch
 - minimal material costs if wood chips from local tree services and in-house materials are used
 - costs of spreading
 - monitoring monthly needed to maintain weed suppressive depth of at least four inches, without geotextile fabric
 - wide range of product costs
 - different aesthetic from bare soil, may look messy to some
 - in some areas children will kick it around, creating aesthetic problems and additional costs of clean-up
 - when mulch biodegrades, it can enhance the habitat for weeds
2. Green flaming
 - propane less expensive per square foot than most herbicides
 - labor of one application equal to synthetic herbicide application
 - effectiveness less than synthetic herbicide applications for certain weeds
 - most cost effective as an early pre-emergent treatment for broadleaf, annual weeds, prior to planting or mulching
3. Aerating & fertilizing
 - may double current turf maintenance bill from outside contractor
4. Grasscycling
 - if contractor has special mulching mowers, this practice can cut aerating and fertilizing bill in half
5. Lowering mower height to reduce clover bloom
 - some scalping may result in bald patches, which may require overseeding
6. Yellowjacket monitoring
 - one time cost of traps
 - one time cost of installing traps
 - weekly monitoring costs, approximately one hour per week spring-fall
 - weekly bait replacement
7. Yellowjacket poison baiting
 - one time cost of traps
 - cost of bait and pesticide
 - daily baiting and trap monitoring during short, intensive period

Bacich Elementary: Recommendations for Integrated Pest Management Training

Hands-on workshops emphasizing the following topics are recommended. Outside contractors should also be required to attend, as a condition of their employment by the school district. Using actual school sites where elements of these programs are in effect will facilitate real-life problem-solving and learning in these areas.

- Non-chemical weed control
- Managing invasive, exotic weeds in minimally managed areas
- Weed IPM
- Yellowjacket IPM - hold at San Marin High
- Record-keeping for IPM programs
- Monitoring pests in an IPM program
- Establishing and verifying treatment thresholds using IPM

EVALUATION OF CURRENT PEST MANAGEMENT PRACTICES

Miller Creek Middle School: Overview

A number of components of an IPM program are already in place at Miller Creek and pesticide use here is low.

- Pocket gophers are monitored daily.
- Mowing is being used for some fenceline weeds and for yellow starthistle.

Miller Creek Middle School: Key Pests

GOPHERS

- High levels of bare, disturbed soil observed in athletic field.
- Gopher mounds proliferating in the field.
- The field backs up to Miller Creek whose banks are heavily forested.
- Last year, there were three broken ankles on this field, reportedly due to gopher holes.
- This field is currently used year-round, with no breaks.

Gopher Management, Current Practices

- Mounds are inspected daily, and active mounds baited with diphacinone (Gopher-Getter® III).

WEEDS - ALONG FENCELINES & OTHER AREAS

- Low plant growth observed along all fencelines inspected.
- Yellow starthistle, California burclover, cheeseweed, and silver knotweed were found on and around track.

Weed Management, Current Practices

- Weeds along some fencelines are sprayed twice a year with glyphosate, formulated as Roundup®. This treatment appears to be suppressing weeds next to fencelines, as no growth taller than three inches was observed in these areas.
- Some fencelines are mowed.
- Yellow starthistle on and around the track is mowed three to four times per year.
- The track is also sprayed up to twice per year with glyphosate, and then spot treated, as needed. The edges of the track are also sprayed up to twice per year with glyphosate. These treatments do not appear to be effectively controlling yellow starthistle, California burclover, cheeseweed, or silver knotweed in these areas. The mowing might even be spreading the yellow starthistle around the area.
- Because bare soil is maintained in many areas around the track, weeds continually invade and can then move into the track.

RED TURPENTINE BEETLE IN MONTEREY PINES

- Red turpentine beetles (*Dendroctonus valens*) are attacking 4 trees in an unirrigated grove of Monterey pines near the school entrance.
- Two other trees have terminal dieback, indicative of pine pitch canker disease. One tree has a large oozing canker.

Red Turpentine Beetle Management, Current Practices

- Trees were reportedly treated once with Dragnet (permethrin), after an infestation was found. Staff observed that treatment was unsuccessful.

YELLOWJACKETS

- Yellowjackets were not reported to be a problem during the warmer months. During the inspection, yellowjackets were observed circling the trash cans in the outdoor lunch area. A pheromone trap was noted in a location above the window where food is dispensed.

Yellowjacket Management, Current Practices

- Trash cans are emptied and cleaned with soap and water daily.

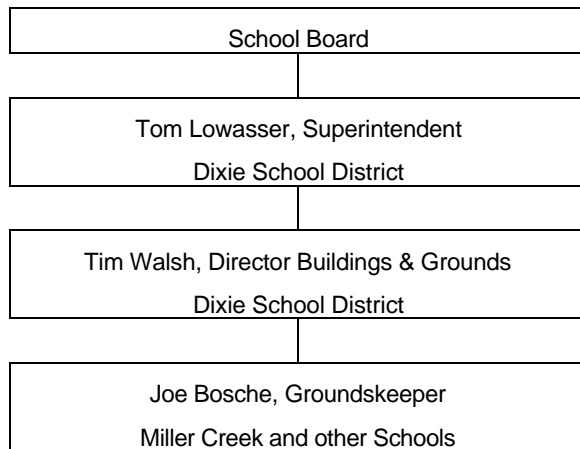
Miller Creek Middle School: Record Keeping

Pesticide use records are kept at the District offices, in San Rafael.

Miller Creek Middle School: Tolerance for Key Pests

<u>KEY PEST</u>	<u>TOLERANCE LEVEL</u>	<u>DETERMINED BY</u>
GOPHERS	Low	Staff
FENCELINE WEEDS	Low	Staff
YELLOW STARHISTLE	Medium	Staff
WEEDS AROUND TRACK	Medium	Staff
BARK BEETLES IN MONTEREY PINE	High	Staff

Miller Creek Middle School: Structure for Pest Management Decision Making



RECOMMENDATIONS

Miller Creek Middle School: Recommendations on Pest Management Policy

We suggest the following:

- Use treatment thresholds for key pests.
- Monitor pest populations and record observations.
- Keep pest management records on site in addition to the district office.
- Keep on site the MSDS's of pesticides used on campus. Store them in a public place in a highly visible container for easy public access.

Miller Creek School: Recommendations for Additional IPM Components for Key Pests

ADDITIONAL IPM COMPONENTS FOR GOPHER MANAGEMENT

- Evaluate field for chemical or physical gopher eradication.
 - Physical eradication could entail trapping with black plastic cylindrical traps for young gophers and wooden traps for older gophers, *or*
 - cross-ripping the field to kill all gophers.
 - If chemical eradication is used, we recommend against strychnine or diphacinone.
- Once eradication is complete, install solid plastic or metal barriers along perimeter to keep gophers out. Consider using tree root barriers and allowing for 9" of above ground barrier to prevent gophers from walking over barriers
- Improve vigor of turf by
 - Resting the field
 - Restoring the soil: analyze for texture and chemistry and with results, design a fertilization program.
 - Grasscycling (this entails using special mowers to cut clipping finely and then leaving clippings on turf) to reduce fertilizer needs and increase vigor.
 - Overseeding any bare areas and any spots that become bare from weed removal
- Maintain dense tree plantings outside of fenceline. (Gophers are not creatures of dense wooded areas.) Use gopher baskets to plant new trees.

ADDITIONAL IPM COMPONENTS FOR WEED MANAGEMENT

Fencelines

- Use green flaming on young weeds during rainy season.
- Pour concrete mow bands. (Check also Yellow Pages for prefabricated mow bands.)
 - For existing fences, pour a 6" wide concrete mow band between turf and fence placing the band as close to fence as possible. This paving prevents weeds from growing adjacent to the fence and provides a paved strip for the wheels of a mower to keep grass and weeds trimmed. The band can also provide access for a string trimmer if planted beds abut the fenceline.
 - For new fences, set fence in a 12" to 16" wide strip of concrete that covers the soil under and beside the fence. This prevents weeds from growing under or adjacent to the fence and provides a paved strip for mower wheels.
- Consider mulching to replace spraying in areas where student activity is not an issue.
- Consider allowing weeds to grow along perimeter fences in remote areas where aesthetics and increasing the weed seed bank are not issues.

Yellow starthistle

- Mow when plants reach 5% bloom. Mow while flowering but not yet setting seed.
- Use mulch to reduce areas of bare soil and annual grasses.
- Landscape bare areas after eradicating existing plants. Pre-germinate seed bank as long as possible before planting.

Other weeds around track

- Spray young seedlings with herbicidal soap.

ADDITIONAL IPM COMPONENTS FOR RED TURPENTINE BEETLE MANAGEMENT

- Red turpentine beetles are often a sign of declining trees, water stress, or soil moisture irregularities.
- Check soil drainage under the pines in several places. Design an irrigation system to match soil texture and drainage. Irrigate trees in dry months.
- Test the 2 trees with terminal dieback for pine pitch canker. If test is positive, remove tree. (Plant Disease Diagnosis in Walnut Creek can do the test. Phone: 925-937-3841.)

IPM COMPONENTS FOR YELLOWJACKET MANAGEMENT

- Remove any traps from eating area to avoid attracting yellowjackets to the area where children are having lunch. When using Sterling® traps baited with pheromone, renew pheromone weekly.
- We strongly recommend using covered garbage cans.
- Use plastic liners in all trash cans and empty food debris containers immediately following lunch (remove plastic liners each time the containers are emptied).
- Monitor grounds for yellowjacket nests and destroy.

If yellowjackets become a more serious problem, the following can be implemented:

- Clean and remove trash cans from eating area after lunch so the area does not become a permanent feeding station for yellowjackets.
- Select other sites on campus for permanent garbage cans. These permanent containers should have swinging lids to prevent yellowjacket access. It will be necessary to educate children on the importance of putting garbage *inside* the can.
- Consider using the following IPM protocol for yellowjacket management:
 - In early spring, monitor yellowjacket population with traps (Yellowjacket Inn®) baited with tuna-flavored cat food.

- When catches exceed 35 to 40 yellowjackets per trap in a 4-hour period, institute poison baiting immediately (using microencapsulated diazinon in fish-flavored cat food).
- Bait should be changed at least twice weekly to ensure freshness and attractiveness of bait. Consider a daily bait change, especially if yellowjacket populations are high.
- Baiting should be necessary only during a short period (perhaps three weeks) in spring.
- Monitor perimeter and outdoor eating areas to spot elevated yellowjacket activity. Search for nests on campus grounds and destroy using least-toxic products. (Consider using mint oil products.)

**SUMMARY OF ALTERNATIVE CONTROLS FOR KEY PESTS
AT MILLER CREEK MIDDLE SCHOOL**

KEY PEST	ALTERNATIVE CONTROLS	GUIDELINES
GOPHERS	Evaluate field for physical or chemical eradication.	Physical: Use black plastic cylindrical traps for young, wooden traps for older gophers. Or, cross-rip field to kill gophers. Chemical: Avoid using strychnine or diphacinone.
GOPHERS	Install barriers along perimeter	Eradicate population inside after barriers are in place.
GOPHERS	Improve turf	1. Rest field 2. Restore soil; analyze texture and chemistry, fertilize as needed 3. Grasscycle 4. Overseed bare and weedy spots
GOPHERS	Maintain dense plantings of trees outside of fenceline	Use gopher baskets to plant new trees along perimeter fences
FENCELINE WEEDS	Green flame	Use on young plants during rainy season
FENCELINE WEEDS	Pour mow bands	For existing fences, 6" concrete strip between fence and turf. For new fences, set in a band of concrete 12" to 16" wide.

<u>KEY PEST</u>	<u>ALTERNATIVE CONTROLS</u>	<u>GUIDELINES</u>
YELLOW STARHISTLE	Mow at 5% bloom.	Do not mow when plants are setting seed.
YELLOW STARHISTLE	Mulch	Reduce areas maintained with bare soils and annual grasses.
YELLOW STARHISTLE	Install competitive plantings	Landscape bare areas, after eradicating existing plants. Pre-germinate seed bank as long as possible before planting
OTHER WEEDS around track	Soap herbicide	Spray young seedlings
RED TURPENTINE BEETLE	Improve tree vigor	1. Check soil drainage 2. If soil drains easily, install irrigation and water during dry month
POSSIBLE PINE PITCH CANKER	None	Test trees for pine pitch canker. If test is positive, remove trees.
If YELLOWJACKETS become a more serious problem:		
YELLOWJACKETS	Monitor with traps starting in early spring. Use poison baiting if population increases.	If and when trap catches reach 35-40 yellowjackets in a 4-hour period in early spring-summer, institute poison baiting.
YELLOWJACKETS	Restrict yellowjacket access to food debris.	Use covered garbage cans.
YELLOWJACKETS	Empty trash cans immediately following lunch.	Use plastic liners in all garbage cans. Replace liners after emptying garbage.
YELLOWJACKETS	Clean and remove trash cans from eating area after lunch.	This is to prevent area from becoming a permanent feeding station.
YELLOWJACKETS	Select other sites on campus for permanent garbage cans. Use cans with swinging lids.	Educate children and staff on the importance of putting garbage <i>inside</i> the can.
YELLOWJACKETS	Empty trash cans on weekends, as needed.	

RECORD KEEPING OPTIONS

Record keeping is important because written records are the memory of an IPM program. They form the basis for making decisions on the most sensible allocation of scarce resources; allow information to be transferred easily and accurately from one employee to another, especially when employees leave the system; and they allow staff to learn more about the nature of various pest problems and which treatments do or do not work. Written records can satisfy public interest in a school's pest control practices and document success stories to share with colleagues and the public.

- Records should be kept on landscape maintenance practices including irrigation, fertilization, aeration, and mowing schedules. Pest monitoring records should also be kept along with any chemical *and* non-chemical pest management activities.

COSTS ASSOCIATED WITH ADOPTING RECOMMENDATIONS

1. Gopher trapping
 - one time cost of traps
 - training, or contracting for trapper to set and check traps during growing season
2. Turf renovation
 - soil analyses and management plan
 - fertilizer
 - seed
3. Gopher barriers
 - trencher rental, purchase, or use
 - small machine operator
 - barrier
4. Dense tree plantings
 - gopher baskets
 - soil preparation
 - plant material
 - planting
 - maintenance
5. Green flaming
 - propane less expensive per square foot than most herbicides
 - labor of one application equal to synthetic herbicide application
 - effectiveness less than synthetic herbicide applications for certain weeds
 - most cost effective as an early pre-emergent treatment for broadleaf, annual weeds, prior to planting or mulching
6. Mow bands
 - concrete
 - installation
7. Mowing yellow starthistle at better time
 - monitor bloom
8. Mulching bare soil near track
 - mulch
 - spreading
 - monitoring
9. Install competitive planting
 - weed control prior to planting
 - soil preparation
 - planting
 - maintenance
10. Herbicidal soap on track for newly emerging annual broadleaf weeds
 - Material costs may be higher than glyphosate

11. Irrigation for Monterey pines
 - irrigation equipment and installation
 - cost of water
12. Testing for pine pitch canker
 - taking samples
 - cost of test
 - tree removal costs if tests are positive
13. Yellowjacket monitoring
 - one time cost of traps
 - one time cost of installing traps
 - weekly monitoring costs, approximately one hour per week spring-fall
 - weekly bait replacement
14. Yellowjacket poison baiting
 - one time cost of traps
 - cost of bait and pesticide (microencapsulated diazinon)
 - daily baiting and trap monitoring during short, intensive period

Miller Creek School: Recommendations for Integrated Pest Management Training

Hands-on workshops emphasizing the following topics are recommended. Using actual school sites where elements of these programs are in effect will facilitate real-life problem-solving and learning in these areas.

- Gopher trapping - hold at San Marin High School
- Yellowjacket IPM - hold at San Marin High School
- Yellow starthistle management
- Non-chemical weed control
- Managing invasive, exotic weeds in minimally managed areas
- Weed IPM
- Monitoring pests in an IPM program
- Establishing and verifying treatment thresholds using IPM

EVALUATION OF CURRENT PEST MANAGEMENT PRACTICES

San Marin High: Overview

Many components of an IPM program are already in place at this school. Spot treatments are used for weeds and one fenceline is mulched very effectively. The very successful pocket gopher management program uses monitoring and intensive trapping. The yellowjacket management program is also highly successful and uses poison baiting for a very short period (three weeks) in the spring. In years past, yellowjacket nests found on campus were destroyed. This year no nests were found

San Marin High: Key Pests

WEEDS

- Clover and annual bluegrass were noted in athletic fields, but these plants are not a concern there for staff.
- Germinating plants observed around fields and structures, along fencelines, in cracks in asphalt and concrete, and elsewhere.

Weed Management, Current Practices

Weeds are treated in a variety of ways around the campus.

- Weeds around athletic fields and athletic structures are treated with spot treatments of glyphosate (Roundup® Pro).
- Weeds along fencelines are mainly treated with glyphosate (Roundup Pro) to maintain bare soil.
- One fenceline area is mulched very effectively.
- Mulch is used in some planting beds. Wood chips from local tree services, and from the school's Christmas tree recycling program are spread in several locations on campus. This is not a favored treatment by staff because of messiness, eventual mulch breakdown, source of weed growth, and the difficulty of weed whipping weeds in mulched areas. Few planted areas were observed to be mulched.
- Mowing with a string trimmer is used in undeveloped areas and along some fencelines and backstops. Some areas are mowed twice a year for aesthetic reasons.
- Yellow starthistle populations in one open area were buried with soil.
- Spraying with glyphosate (Roundup Pro) appears to be the main treatment method for weeds. The following applications were reported in 2000:
 - Fenceline weeds were sprayed with glyphosate (Roundup Pro) around the playing fields four times.
 - Building borders were sprayed with glyphosate once.
 - The shot-put track weeds are sprayed with glyphosate. In 2000, it was sprayed at least once.
 - The area around the bleachers was sprayed with glyphosate once.
 - Weeds around the cinder track are weed whipped or sprayed with glyphosate. In 2000, it was sprayed at least once.
 - Weeds in black top (asphalt) and concrete cracks were sprayed once with glyphosate.
 - Weeds in small turf areas were sprayed once.
 - Cinder infields in the three baseball fields were treated once.

GOPHERS

- Low population of gophers noted in athletic fields.

Gopher Management, Current Practices

- Trapping is the sole management technique.
- Black plastic cylindrical traps are used for young gophers, wooden box traps for older gophers.
- According to the groundskeeper, who does all of the trapping, his program has removed about 75% of the population that was occupying the athletic fields prior to trapping.
- Trap maintenance is carried out on a daily basis, first thing in the morning.
- After setting the traps, he revisits them in 2-2.5 hours. Usually about 33% of the traps set have gophers in them.

YELLOWJACKETS

- Prior to this year, four to five yellowjacket nests have been discovered on campus each year. This year no nests were found.
- Yellowjackets are a problem, but have been controlled with intensive baiting in the spring (see below).

Yellowjacket Management, Current Practices

- Trash cans are emptied within one-half hour of finish of lunch
- This year yellowjackets were controlled by baiting with microencapsulated diazinon in fish-flavored cat food. Traps were placed on perimeter fences, every 100 feet and bait was changed every week. Intense baiting was carried on in early spring this year for three weeks.

GROUND SQUIRRELS

- Ground squirrels (California ground squirrel, *Spermophilus beecheyi*) are a problem in the quad in front of the student center.
 - In this area, a grove of California Bay Laurel (*Umbellularia californica*) trees has been preserved.
 - Benches surround each tree, and the soil is covered with gravel interspersed with cement pavers.
 - Ground squirrels burrow throughout these areas, creating tripping hazards by moving the pavers. The squirrels also move soil and gravel around in ways that are considered unaesthetic.
- Other areas with ground squirrel burrows were visible in regions outside of the bay grove. Ground squirrels move from the surrounding areas into the vacuum left when squirrels are removed from the grove.

Ground Squirrel Management, Current Practices

- Grain treated with strychnine is placed into ground squirrel holes and checked within 24 hours.
- Sixty-five ground squirrels were removed from the region of the grove this year.
- Ground squirrels outside the quad are not disturbed.

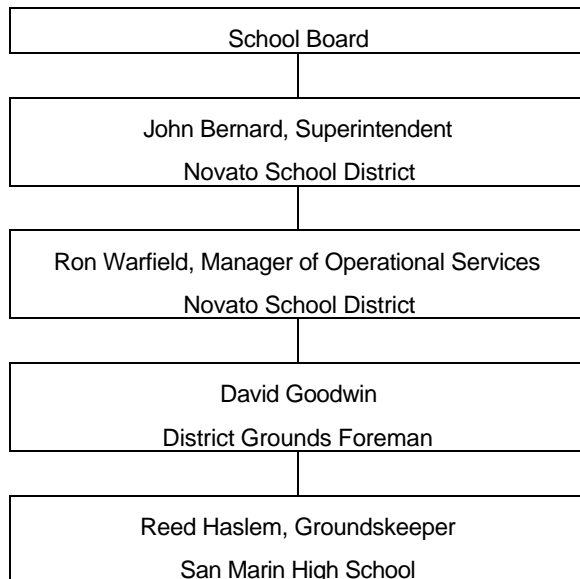
San Marin High: Record Keeping

Pesticide use records are kept at the District offices, in Novato.

San Marin High: Tolerance for Key Pests

<u>KEY PEST</u>	<u>TOLERANCE LEVEL</u>	<u>DETERMINED BY</u>
GROUND SQUIRRELS	Low	Staff
WEEDS	Low	Staff
GOPHERS	Zero in fields	Staff
YELLOWJACKETS	Low for nests	Staff

San Marin High: Structure for Pest Management Decision Making



RECOMMENDATIONS

San Marin High: Recommendations on Pest Management Policy

We suggest the following:

- Refine treatment thresholds for key pests.
- Monitor pest populations and record observations.
- Keep pest management records on site in addition to the district office.
- Keep on site the MSDS's of pesticides used on campus. Store them in a public place in a highly visible container for easy public access.

San Marin High: Recommendations for Additional IPM Components for Key Pests

ADDITIONAL IPM COMPONENTS FOR WEED MANAGEMENT

Fencelines

- Use green flaming on young weeds during the rainy season.
- Install concrete mow bands. (Check Yellow Pages for pre-fabricated bands.)
 - For existing fences, install a 6" wide concrete mow band between turf and fence placing the band as close to fence as possible. This paving prevents weeds from growing adjacent to the fence and provides a paved strip for the wheels of a mower to keep grass and weeds trimmed. The band can also provide access for a string trimmer if planted beds abut the fenceline.
 - For new fences, install a 12" to 16" wide strip of concrete that covers the soil under and beside the fence. This prevents weeds from growing under or adjacent to the fence and provides a paved strip for mower wheels.
- Consider mulching to replace spraying in other areas where student activity is not an issue.
- Consider allowing weeds to grow along perimeter fences in remote areas where aesthetics and increasing the weed seed bank are not issues.

- Spot treat noxious weeds, such as yellow starthistle, with least-toxic herbicides.

Asphalt & concrete cracks

- Routine quarterly monitoring with treatments if necessary
- Increase frequency of pavement crack repair
- Use green flaming during the rainy season
- Use infrared heat (Infra-Weeder® Landscaper 100 or 300)

Small turf areas

- Intensify cultural management:
 - Annual to bi-annual soil testing and fertilizing as needed
 - Bi-annual to quarterly aerations, as needed
 - Annual overseeding, as needed
- Quarterly weed monitoring and use of the following management tactics, as needed and as appropriate:
 - Pre-emergent control of specific broadleaf weeds, such as dandelion, with corn gluten meal
 - Post-emergent spot treatment of specific weeds using least-toxic alternative such as infra red heat (Infra-Weeder® Dandy-Destroyer)
 - Spot treat with least-toxic herbicides such as BioGanic® Broadleaf Killer or BioGanic Weed and Grass Killer (active ingredient: clove oil)

Infields and edges of tracks

- Identify weed species throughout the year and design a management program incorporating physical controls
- Consider green flaming during the rainy season and infra red heat treatment any time

ADDITIONAL IPM COMPONENTS FOR GOPHER MANAGEMENT

- Monitoring and trapping are in place and working well
- Consider trapping in areas adjacent to fields to reduce reservoir and influx

ADDITIONAL IPM COMPONENTS FOR YELLOWJACKET MANAGEMENT

We suggest adding the following IPM protocol components for yellowjacket management:

- In early spring, monitor yellowjacket population with traps (Yellowjacket Inn®) baited with tuna-flavored cat food.
- When catches exceed 35 to 40 yellowjackets per trap in a 4-hour period, institute poison baiting immediately.

We also suggest an attempt at twice weekly bait changes to ensure freshness and attractiveness of bait. If this an improvement, consider a daily bait change, especially if yellowjacket populations are high.

ADDITIONAL IPM COMPONENTS FOR GROUND SQUIRREL MANAGEMENT

Areas outside of quad

- Evaluate the ground squirrel population
- To reduce population, consider least-toxic alternatives first such as, re-designing the area to eliminate ground squirrel habitat, trapping, and/or baiting with less toxic rodenticides.

Quad located in bay grove

- Use traps or less-toxic rodenticides in feeding boxes.
- Re-design paving and seating around trees: consider removing cement pavers, but preserving gravel.
- Consider installing barriers to keep squirrels out and then eradicate the population inside the barriers.

**SUMMARY OF ALTERNATIVE CONTROLS FOR KEY PESTS
AT SAN MARIN HIGH SCHOOL**

<u>KEY PEST</u>	<u>ALTERNATIVE CONTROLS</u>	<u>GUIDELINES</u>
GROUND SQUIRRELS (area outside of quad)	Monitor and manage population outside grove	Use traps or anti-coagulants in feeding boxes.
GROUND SQUIRRELS (in quad located in bay grove)	Traps or anti-coagulants in feeding boxes. Re-design paving and seating around trees	Preserve pervious paving, install barriers to keep squirrels out, and eradicate squirrels within barriers.
WEEDS (fencelines, paving, other)	Green flame	Best for newly emerged, broadleaf weeds
WEEDS (fencelines)	Mow band	For existing fences, 6" concrete strip between fence and turf. For new fences, install a concrete band 12" to 16" wide.
WEEDS (planted areas, non-turf)	Green flame Geotextile covered with 4" of mulch. Eradicate weeds prior to placement Monitor areas bi-monthly and remove weeds by hand. Cover with 4" of mulch	
OTHER WEEDS	Soap herbicide	Spray young seedlings
GOPHERS	Trap in areas adjacent to field.	
YELLOWJACKETS	Monitor with traps starting in early spring.	If and when population begins to increase in spring-summer, institute poison baiting. Replace bait daily rather than weekly.
YELLOWJACKETS	Monitor for nests on campus.	Destroy nests found.
YELLOWJACKETS	Empty trash cans immediately following lunch.	
YELLOWJACKETS	Clean and remove trash cans from eating area after lunch.	This is to prevent area from becoming a permanent feeding station.
YELLOWJACKETS	Select other sites on campus for permanent garbage cans. Use cans with swinging lids.	Educate children and staff on the importance of putting garbage <i>inside</i> the can.
YELLOWJACKETS	Empty trash cans on weekends, as needed.	

RECORD KEEPING OPTIONS

Record keeping is important because written records are the memory of an IPM program. They form the basis for making decisions on the most sensible allocation of scarce resources; allow information to be transferred easily and accurately from one employee to another, especially when employees leave the system; and they allow staff to learn more about the nature of various pest problems and which treatments do or do not work. Written records can satisfy public interest in a school's pest control practices and document success stories to share with colleagues and the public.

- Records should be kept on landscape maintenance practices including irrigation, fertilization, aeration, and mowing schedules. Pest monitoring records should also be kept along with any chemical *and* non-chemical pest management activities.

COSTS ASSOCIATED WITH ADOPTING RECOMMENDATIONS.

1. Green flaming for weeds
 - propane (less expensive per square foot than most herbicides)
 - fire extinguisher
 - training, or cost of outside contractor
 - labor of one application equal to synthetic herbicide application
 - additional labor costs if used as a replacement for glyphosate
 - effectiveness less than synthetic herbicide applications for certain weeds
 - most cost effective as an early pre-emergent treatment for broadleaf, annual weeds, prior to planting or mulching
2. Infrared heat for weeds
 - cost of device
 - cost of time for personnel to learn how to use tool
3. Alternative herbicides
 - material cost—BioGanic® (clove oil)
4. Mulch
 - minimal material costs if wood chips from local tree services and in-house materials are used
 - costs of spreading
 - monitoring monthly needed to maintain weed suppressive depth of at least four inches, without geotextile fabric
 - wide range of product costs
 - different aesthetic from bare soil, may look messy to some
 - in some areas children will kick it around, creating aesthetic problems and additional costs of clean-up
 - when mulch biodegrades, it can enhance the habitat for weeds
5. Mow bands for weeds
 - materials and time to pour
 - cost of pre-fab bands, if available, and installation
6. Weed monitoring in turf
 - labor
7. Soil testing
 - labor to collect sample
 - cost of test
8. Aerating turf
 - labor
9. Fertilizing turf
 - materials
 - labor
10. Overseeding turf
 - seed
 - labor

11. Yellowjacket monitoring
 - one time cost of traps
 - one time cost of installing traps
 - pheromone/cat food bait for weekly bait replacement
 - weekly monitoring costs, approximately one hour per week spring-fall
12. Increased gopher trapping outside of fields
 - labor
 - traps
13. Area-wide management for ground squirrels
 - monitor populations
 - design management program
14. Traps for ground squirrels
 - cost of traps
 - labor for trapping
15. New paving design and installation
 - design and installation costs
 - labor for intensification of control program

San Marin High: Recommendations for Integrated Pest Management Training

Hands-on workshops emphasizing the following topics are recommended:

- Mulch for weed control
- Weed management in turf
- Monitoring and record keeping in an IPM program
- Vertebrate pest control—habitat management

Assessment Of Current Structural Pest Management Practices at Three Marin County Schools

MODEL INTEGRATED PEST MANAGEMENT PLAN FOR SCHOOLS ASSESSMENT OF CURRENT STRUCTURAL PEST MANAGEMENT PRACTICES AT THREE MARIN COUNTY SCHOOLS:

Bacich Elementary School, Miller Creek Middle School, and San Marin High School

Report prepared by: Michael A. Wolf
ipm-BioCare Services & Specialty Products
75 Executive Avenue, Suite 9
Rohnert Park, California 94928
(707) 586-3355; (707) 586-2759 Facsimile

Inspection dates: November - December 2000

Inspected by: Dan T. Lepez

HISTORY OF LANDSCAPE PEST CONTROL

Bacich Elementary School, located in the city of Kentfield, is in the Kentfield Unified School District. Parent concern about pesticides in schools has led the District to adopt an IPM policy. The last reported pesticide application was on April 7, 1999. Since then, the school has had a "No Chemical" policy. Staff indicated that there are no particular problems with pests within the interior of the structures.

Miller Creek Middle School, located in Marinwood in unincorporated Marin County, is in the Dixie School District. Staff indicated that no pesticides have been applied to the interior of any structure in the past 15 years. Some preventive measures are followed such as daily removal of trash and rinsing containers with soap and water.

San Marin High School, located in the city of Novato, is in the Novato Unified School district. Among the structural pests present, only ants are being treated with pesticide (PT265A, microencapsulated diazinon). Pesticide use reports are regularly filed with the County Agricultural Commissioner's Office.

Common to all three sites were the following items:

- Staffing needs

As is often the case with many California school districts, maintenance staffing is the major need at all three of the Marin County school sites chosen for this survey. Far too much of a

burden is already placed upon the staff to take care of daily maintenance issues for them to find any additional time and manpower to identify and implement long-term solutions to pest management problems.

- Inefficiency in the system

Communication seems to be the key in this regard. School administration should be the rallying point from which pest management issues are coordinated and implemented. Unfortunately, many individuals have a tendency to bypass this formal type of system in an effort to minimize response time. Often this bypass

approach leads to long-term solutions never being properly addressed. Poor planning and lack of coordination between departments can leave current issues unresolved and control measures haphazard.

- Pest monitoring

Pest monitoring protocols need to be established at all three school sites. This should include placement and monitoring of sticky traps and/or other traps and visual inspection for insect, bird, rodent, and other small mammal activity in and around buildings. School staff or an outside pest control operator contractor should be assigned the task of monitoring the traps. Quarterly monitoring is recommended at this time.

Control treatments, if needed, should be developed and reviewed by school staff both at the local and district levels. Efficacy and safety should be paramount in this decision-making process. All steps performed during the control process must be documented. Pest monitoring must continue during and after the control process. If monitoring data indicate that further treatment is required, the control program should be re-evaluated, adjusted, and repeated as needed.

- Pest management is not static

Note that pest management must be dynamic and not static. All persons involved in the operation of the schools should be encouraged to provide as much information as possible (what, where, when, and how many) to administrative staff in regard to any observed pest activity. Communication and cooperative assistance will aid greatly in achieving a pest-free environment.

- Integrating pest management concerns for both structures and grounds

Maintenance of both grounds and structures is the key ingredient in achieving a pest-free environment. Particular attention should be directed towards coordinating remedial measures which may impact both grounds areas and structures. Pest prevention inspections should be scheduled whenever outside contractors or in-house staff perform additions to or modifications of structures or grounds support systems (e.g., irrigation systems, etc.).

- Training requirements

All staff, including administrators, teachers, maintenance personnel, volunteer staff and even students must be included in the overall pest management system to obtain positive results. In particular, building maintenance staff and grounds maintenance personnel need to be informed about the potential conflicts their operations may have with pest management issues. Users and service providers of the physical plant of any school should be aware of the steps which need to be followed so that an effective pest management control strategy can be formulated and set into motion.

For the above pest management protocol to operate efficiently, maintenance and administrative staff must be trained in recognizing the signs of current or imminent pest activity. Obviously, school staff would be the key in providing the school site with an uninterrupted and effective long-term pest management program.

EVALUATION OF CURRENT PEST MANAGEMENT PRACTICES

Bacich Elementary: Key Pests

ARGENTINE ANTS

- Argentine ants have been the most problematic pest at this school site.

Ant Management, Current Practices

- Staff have effectively used sanitation (emptying trash containers) and prevention (steam cleaning or sweeping the outside student lunch area).

PEST BIRDS

- Pest birds, namely feral pigeons and seagulls, were observed to be active along the rooftops of various structures. The birds are attracted to the site because of an abundance of available food and the proximity of this school site to water. Birds are not nesting anywhere on the school site. They are, however, loafing on the roofs of structures waiting for any available food.

Pest Bird Management, Current Practices

- Sanitation (emptying trash containers) and prevention (steam cleaning or sweeping the outside student lunch area) are the current management practices.

RODENTS

- Rodents, including mice and rats, were not cited as being a problem.
- The potential for rodent problems was evident as a number of vent screens need to be repaired, replaced, or installed along exterior perimeters of various structures.

SMALL ANIMALS

- Small animals such as skunks, raccoons and opossums could be problematic as a number of areas around the perimeter of structures have access areas large enough for these animals to get in and take up residence.

STANDING WATER

- Standing water problems caused by improper grade levels or poorly functioning drainage systems were observed in many areas of the school campus. These conditions are conducive to termite and fungus growth that can eventually become a major cause of structural problems.

Bacich Elementary: Record Keeping

All records in regard to pest management relate to grounds applications only. Pesticide Use Reports are submitted to County Agricultural Commissioners office as required. Structural pest management records are not kept or filed at this time since no pesticides (structural) are in use.

Bacich Elementary: Tolerance for Key Pests

Ants and yellowjackets seem to be the major pests of concern at this school site. School staff takes this problem seriously as trash containers are emptied as needed; food debris containers are emptied and washed out thoroughly with soap and water on a daily basis. Recycling containers are emptied on a once-weekly schedule.

RECOMMENDATIONS

Bacich Elementary: Recommendations on Building Maintenance

Classrooms 1 - 6

- Room 2: 1' x 4' screen needs to be secured or replaced as needed.

PTA Portable

- Rear side: Approx. 45 linear feet of existing screen mesh barriers have failed and need to be replaced.
- North side: Three (6" x 18") vents need to be sealed.
- West side: 3" x 1' opening needs to be sealed.

Portables P1 - P4

- Earth to wood contact along south, north, and west sides of structures.

Portable - P1

- Openings under front door entry need to be sealed. Access for small animals was evident.

Portable - P2

- North side: Two 4' x 1' heating/ventilation/air conditioning systems (HVACS) have a narrow gap at the top on all four sides that needs to be sealed. If these are not sealed, small birds can find their way in to the HVACS.
- Wood lattice around front porch area (approx. 80 linear feet) should be removed, 1/4" hardware cloth installed, and latticework replaced.
- Openings under entry steps and front deck area should be fitted with 1/4" hardware cloth to prevent small animals from gaining entry under portable.

Portable - P3

- South side: Two 2' x 4' HVACS need to be sealed along top of enclosures.
- East side: 2" opening located along base of structure needs to be sealed.
- Monitor upper ledge beams for rodent or pest bird activity.

Portables - Day Care Center

- An opening 5' x 150' was found and needs to be sealed using 1/4" hardware cloth.
- West side: two 3' x 4' openings in the siding should be sealed with 1/4" hardware cloth.
- Trim trees away from structure.
- Opening (6" x 6") around pipe should be sealed with wood trim, wire mesh, or wire mesh with expanding foam..
- West side: On rear deck, approximately 25 linear feet should be sealed with 1/4" hardware cloth. Vent screen needs to be replaced. Dead rodent was found and removed at time of inspection.

Classrooms 1 - 6

- Room 6: Repair screen or replace as needed.
- Trees overhanging all structures should be trimmed back because rodents or small vertebrates can gain access to top of structures using the trees.

Classrooms 13 - 14

- West side: Organic garden should be monitored for aphid activity. Ants could be a problem when aphids are active.
- Door adjacent to kindergarten entrance needs to be sealed.

Classrooms 19 - 26

- South side: All 5 doors need to be properly fitted with weather-stripping.

Ball Field

- All trash containers require covers, as deposited food debris will attract insects, rodents and small vertebrate pests.

Bacich Elementary: Recommendations on Alternative Management for Key Pests

ARGENTINE ANT MANAGEMENT RECOMMENDATIONS

- Maintain sanitation measures.
- Keep cracks and crevices sealed, especially those leading to the outside.
- Use diatomaceous earth or silica gel in wall voids or as a crack and crevice treatment.
- If ants become a more serious problem, use ant bait stations containing boric acid, borax, hydramethylnon, or fipronil. Always set bait stations in the ant trail, but out of sight and reach of children. If this is not possible, use at night or on weekends and remove when children are in school. In any case, remove bait stations when ant trail has disappeared so as not to attract more ants to the spot.

PEST BIRD MANAGEMENT RECOMMENDATIONS

- Maintain sanitation measures.
- Birds should not be feed anywhere on campus. Suggest posting signs with information about the negative aspects of feeding birds.
- Make sure that garbage cans in outdoor lunch area are emptied immediately after lunch and that any food debris on the ground is removed so birds will not be attracted to the site. All trash cans should be fitted with tightly closing lids (e.g., domed, swinging lids).
- Consider selecting other sites on campus for permanent garbage cans and fit these cans with domed, swinging lids.
- Empty trash cans on weekends as needed.

RODENT MANAGEMENT RECOMMENDATIONS

- Maintain sanitation measures.
- Regularly monitor buildings and grounds for rodent activity.
- Regularly monitor buildings and grounds for rodent access holes and repair.
- Keep vents screened and screens in good repair.

SMALL ANIMAL MANAGEMENT RECOMMENDATIONS

- Regularly monitor buildings and grounds for small animal activity.
- Regularly monitor buildings and grounds for small animal access holes and repair.
- Keep vents screened and screens in good repair.
- Maintain sanitation measures.

MOISTURE MANAGEMENT RECOMMENDATIONS

- Regularly monitor areas with standing water problems. Look for soft wood, fungus, and evidence of termite activity.
- Keep drains clean so water flow is not impeded.
- Correct improper grading that leads to standing water.

**ALTERNATIVE CONTROL RECOMMENDATIONS FOR KEY PESTS
AT BACICH ELEMENTARY SCHOOL**

<u>KEY PEST</u>	<u>ALTERNATIVE CONTROLS</u>	<u>GUIDELINES</u>
ARGENTINE ANTS	Maintain sanitation.	Recommend using plastic liners in trash cans and replacing liners after emptying cans. Steam clean outdoor lunch area monthly in warmer months and less frequently in winter.
	Seal cracks & crevices	Especially cracks leading to the outside.
	Use diatomaceous earth or silica gel in wall voids or as crack and crevice treatment	Long-lasting treatment that can prevent other crawling insects.
	For serious invasions use ant baits.	Use baits containing boric acid, borax, hydramethylnon, or fipronil. Place on trail but out of sight and reach of children.
PEST BIRDS	Seagulls and feral pigeons should not be fed anywhere on the school site.	Post signs with information on the negative aspects of feeding birds.
	Keep all trash and other food debris unavailable to birds.	All trash containers should be fitted with tightly closing lids.
RODENTS	Monitor buildings and grounds for rodent activity.	Rodent activity = live or dead animals, droppings, gnawing, grease marks, runs,

<u>KEY PEST</u>	<u>ALTERNATIVE CONTROLS</u>	<u>GUIDELINES</u>
		burrows, tracks.
	Monitor buildings and grounds for rodent access holes. Repair.	Fill holes down to 1/2", look for gaps in doors, holes in vents, holes around pipes & wires, etc.
	Keep vents and windows screened and screens in good repair.	
	Maintain sanitation.	Dumpster should be cleaned monthly in warmer months. Ask sanitation company to clean or replace dumpster. Minimize clutter in storerooms and classroom storage areas.
SMALL ANIMALS	Monitor buildings and grounds for small animal activity.	Look for live or dead animals, droppings, tracks.
	Monitor buildings and grounds for access holes. Repair.	Fill holes down to 1/2", look for gaps in doors, holes in vents, holes around pipes & wires, holes & gaps that would allow small animals to get under buildings.
	Keep vents and windows screened and screens in good repair.	
	Maintain sanitation.	See above under rodents.
STANDING WATER	Monitor areas with standing water problems	Look for soft wood, fungus, evidence of termites
	Keep drains clean so water flow is unimpeded.	
	Correct improper grading that leads to standing water.	

RECORD KEEPING OPTIONS

We recommend that monitoring data be recorded and kept at the school site. All non-chemical pest control actions should also be recorded and kept on site.

COSTS ASSOCIATED WITH ADOPTING RECOMMENDATIONS

1. Building maintenance/pest-proofing
 - materials such as caulk, hardware cloth, screen, weather-stripping, etc.
 - labor
 - periodic monitoring (1 or 2 man-hours per quarter) for pests and/or situations that might lead to pest problems (holes, signs of birds, small mammals, or insects outside and inside, etc.)
2. Sanitation
 - plastic trash can liners
 - covers for current trash cans or new trash cans with covers
 - labor for washing outdoor lunch area
 - no costs should be incurred to improve cleanliness of dumpster other than time to persuade sanitation company to clean or replace dumpster more frequently
3. Moisture management
 - quarterly monitoring
 - labor for maintaining outside drains
 - labor and equipment to correct grading problems

Bacich Elementary: Recommendations for Integrated Pest Management Training

Hands-on workshops emphasizing the following topics are recommended.

- Inspecting buildings and grounds for structural pests and situations that lead to structural problems
- Record-keeping for IPM programs
- Pest-proofing techniques and preventive pest management for structural pests

EVALUATION OF CURRENT PEST MANAGEMENT PRACTICES

Miller Creek Middle School: Key Pests

ARGENTINE ANTS

- Argentine ants seem to be the major pest of concern at this site.

Ant Management, Current Practices

- Staff have effectively used sanitation (emptying trash containers) and prevention (steam cleaning or sweeping the outside student lunch area).

PEST BIRDS

- Pest birds, namely seagulls, were observed to be active along the south roof of the gymnasium.

Pest Bird Management, Current Practices

- Sanitation (emptying trash containers) and prevention (steam cleaning or sweeping the outside student lunch area) are the only current management practices.

RODENTS

- Rodents, including mice and rats, were not cited as being a problem.
- The potential for rodent problems was evident as a number of vent screens need to be repaired, replaced, or installed along exterior perimeters of various structures.

SMALL ANIMALS

- Small animals such as skunks, raccoons, and opossums could be problematic as a number of areas around the perimeter of structures have access areas large enough for these animals to get in and take up residence.

STANDING WATER

- Standing water problems caused by improper grade levels or poorly functioning drainage systems were observed in many areas of the school campus. These conditions are conducive to termite and fungus growth that can eventually become a major cause of structural problems.

Miller Creek Middle School: Record Keeping

All records in regard to pest management relate to grounds applications only. Pesticide Use Reports are submitted to County Agricultural Commissioner's office as required. Structural pest management records are not kept or filed at this time since no pesticides (structural) are in use.

Miller Creek Middle School: Tolerance for Key Pests

Ants seem to be the major pest of concern at this school site. The staff takes this problem seriously as trash containers are washed out thoroughly with soap and water on a daily basis and whenever ant invasions appear.

RECOMMENDATIONS

Miller Creek Middle School: Recommendations on Building Maintenance

The overall structural maintenance of the Miller Creek Middle School is satisfactory. Deficiencies that are likely to allow pests enter into or under structures are listed below.

- All doors to storerooms and janitor's closets should be kept locked during normal school hours and identified with proper signage.
- Duct work throughout the school should be inspected for integrity.

Kitchen Area

- All dry goods should be rotated in order to minimize the possibility of stored product pest infestations.
- M3—Rear kitchen area: Yellowjacket catch trap should be removed and placed away from the structure.
- Soft drink machine and oven should be moved and cleaned underneath thoroughly on a regular schedule (every quarter, or during school holidays).
- All ductwork and associated filters should be inspected and cleaned on a regular basis to minimize buildup of debris and fire hazards. It may be necessary to hire a person specializing in duct work to inspect and make recommendations on a maintenance schedule.

Exterior Lunch Area (50' x 50')

- Requires thorough cleaning on a more frequent basis than is provided now (twice yearly power washing). We recommend every month during the warmer months and less frequently during the winter.

Dumpsters

- Dumpsters are steam cleaned once yearly. This should be increased to monthly during the warmer months to minimize food debris accumulation. Sanitation company can either steam clean dumpsters or provide clean ones.

Trash Containers

- All trash containers should be equipped with plastic liners that are replaced when garbage is emptied. They are currently emptied and cleaned with soap and water on a daily basis.

Bird Feeders

- Bird feeders should be moved further away from structures or removed. Feeding birds on the school grounds should be discouraged.

Front Entry to Main Office

- Oak 1/2 barrels (4) should be removed as fungus and ant activity was evident. The concrete surface has a number of cracks and patches under which ants seem to be active.

Drain Grates (3' x 3')

- These should be monitored and maintained free of debris in order to minimize standing water problems.

M1 Building

- Rear vents should be fitted with 1/4" wire mesh screening to prevent rodents from gaining entry.

Portables

- Earth to wood contact where supporting 4" x 4"s are in direct contact with earth substrate and in some cases, standing water.

- Earthquake joints between all portables are sealed with panels that need to be redesigned so that these portions of the structures are pest-proof. This may necessitate consultation from an engineer in conjunction with a pest control professional.
- All void areas located between portables should be inspected and cleared of debris on a regular schedule.
- All trees overhanging the structures should be trimmed away.
- Gutters should be inspected and cleared of debris as needed.
- Five heating/ventilation/air-conditioning system (HVACS) units (2' X 4') have a gap at the top on all four sides that should be sealed to prevent small birds from gaining access.

Portables E7-E11

- Wooden deck, front area (40' X 100') should be properly sealed to minimize animal access underneath.
- Front door, lower panel needs to be adjusted down to be pest-proof.
- West end, 2" x 2" gaps should be sealed.

Portables E4-E6

- South side: Erosion problems were evident. This area requires trenching (4" X 10') and concrete channeling in order to direct hillside runoff away from the structure.
- West side: Various small openings along a 45 foot length of structure require pest proofing measures.
- Three HVACS with a 1" X 4' gap at top should be sealed to prevent access by small birds.
- North side: Earth to wood contact and poor drainage along the exterior perimeter. Deck should be sealed on both ends (1' X 5') to prevent animal access underneath.

Portables E1-E3

- South side: Seal opening (1' x 4') at end of structure.
- These portables are also equipped with earthquake joints with cover panels that need to be redesigned so that these portions of the structures are pest-proof.
- Three HVACS with 1" X 4" gap at top should be sealed to prevent access by small birds.
- Rusty screen vents should be replaced before they fail.
- Standing water problems were evident; drainage issues need to be addressed as earth to wood contact and high moisture conditions are conducive to structural pest problems.

Portables D5-D7

- North side: 8" x 4' opening at end needs to be sealed.
- Replace all screens (4 at 6" X 2'.)
- Opening (4" X 4') at ground level needs to be sealed.
- Earthquake joint areas on these structures also need reconfiguration in order to be pest-proof.

Portables D3-D4

- East side: 1' x 4' opening on end of front deck needs to be sealed.
- South side: Erosion problems were evident along with earth to wood contact.
- West side, rear: Drainage problems need to be addressed.

Portables D1-D2

- West side: One 2" diameter vent opening needs to be fitted with 1/4" hardware cloth screen mesh.

Portables C6-C7

West side: Two 2" diameter vents need to be fitted with 1/4" hardware cloth screen mesh.

Portables C1-C2

- Food container debris behind hedges should be cleared away.
- C2 southwest corner: 2" opening around conduit leading into the structure should be sealed.

Portable C4-C5

- Approximately 60 linear feet of ramp access to units need to be sealed along the front using a trench and wire mesh system.
- Raccoon activity was evident.
- Gaps along the top of 2 HVACs need to be sealed.
- West side, along rear: Drainage problems were evident as 2 vents screens were covered by standing water.

Main Library

- North side: All doors need to be properly weather-stripped.

A Building

- East side, 2" diameter screen needs to be installed.

Drama Room

- Upper portion (gymnasium south): Should be fitted with a single wire repellent system (approx. 150 linear feet) to prevent seagulls from roosting/loafing along roof ledge. Inspect roof for standing water problems as this may be the reason the seagulls prefer this particular structure.

Boys Locker Room

- Recycling area, entry door needs to be repaired.

Boiler Room

- Screened opening 3' x 4' should be equipped with insect-proof screening.

Gymnasium

- Southwest side rear: Entry door needs to be equipped with a proper threshold and door sweep.
- Rot problems were evident along the entire perimeter wall of structure.
- Tim Walsh indicated that the major repairs were scheduled to address the rot problem along all exterior walls in the near future.

Miller Creek School: Recommendations on Alternative Management for Key Pests

ARGENTINE ANT MANAGEMENT RECOMMENDATIONS

- Maintain sanitation measures.
- Keep cracks and crevices sealed, especially those leading to the outside.
- Use diatomaceous earth or silica gel in wall voids or as a crack and crevice treatment.
- If ants become a more serious problem, use ant bait stations containing boric acid, borax, hydramethylnon, or fipronil. Always set bait stations in the ant trail, but out of sight and reach of children. If this is not possible, use at night or on weekends and remove when children are in school. In any case, remove bait stations when ant trail has disappeared so as not to attract more ants to the spot.

PEST BIRD (SEAGULL) MANAGEMENT RECOMMENDATIONS

Seagulls are opportunistic feeders and will develop a routine of feeding if they are fed or food is made available to them. They will land and observe from roof edges any activity which may lead to food availability.

- Maintain sanitation measures.

- Make sure that garbage cans in outdoor lunch area are emptied immediately after lunch and that any food debris on the ground is removed so birds cannot use the area as a permanent feeding station.
- Consider selecting other sites on campus for permanent garbage cans and fit these cans with tightly closing lids (e.g., domed, swinging lids).
- Install a single wire under tension along the roof edge of the south side of the gymnasium. This will deny access to seagulls.

RODENT MANAGEMENT RECOMMENDATIONS

- Regularly monitor buildings and grounds for rodent activity.
- Regularly monitor buildings and grounds for rodent access holes and then repair.
- Keep vents screened and screens in good repair.
- Maintain sanitation measures.

SMALL ANIMAL MANAGEMENT RECOMMENDATIONS

- Regularly monitor buildings and grounds for small animal activity.
- Regularly monitor buildings and grounds for small animal access holes and then repair.
- Keep vents screened and screens in good repair.
- Maintain sanitation measures.

MOISTURE MANAGEMENT RECOMMENDATIONS

- Regularly monitor areas with standing water problems. Look for soft wood, fungus, and evidence of termite activity.
- Keep drains clean so water flow is not impeded.
- Correct improper grading that leads to standing water.

**ALTERNATIVE CONTROL RECOMMENDATIONS FOR KEY PESTS
AT MILLER CREEK MIDDLE SCHOOL**

<u>KEY PEST</u>	<u>ALTERNATIVE CONTROLS</u>	<u>GUIDELINES</u>
ARGENTINE ANTS	Maintain sanitation.	Recommend using plastic liners in trash cans and replacing liners after emptying cans. Steam clean outdoor lunch area monthly in warmer months and less frequently in winter.
	Seal cracks & crevices	Especially cracks leading to the outside.
	Use diatomaceous earth or silica gel in wall voids or as crack and crevice treatment	Long-lasting treatment that can prevent other crawling insects.
	For serious invasions use ant baits.	Use baits containing boric acid, borax, hydramethylnon, or fipronil. Place on trail but out of sight and reach of children.
PEST BIRDS (SEAGULLS)	Roof ledge along south side of gymnasium should be fitted with a single wire repellent system. Check roof for standing water that may be attracting seagulls	A single wire is strung under tension along the roof ledge which denies seagulls access to ledge.
RODENTS	Monitor buildings and grounds for rodent activity.	Rodent activity = live or dead animals, droppings, gnawing, grease marks, runs, burrows, tracks.
	Monitor buildings and grounds for rodent access holes. Repair.	Fill holes down to 1/2", look for gaps in doors, holes in vents, holes around pipes & wires, etc.
<u>KEY PEST</u>	<u>ALTERNATIVE CONTROLS</u>	<u>GUIDELINES</u>

RODENTS (cont.)	<p>Keep vents and windows screened and screens in good repair.</p> <p>Maintain sanitation.</p>	<p>Dumpster should be cleaned monthly in warmer months. Ask sanitation company to clean or replace dumpster. Minimize clutter in storerooms and classroom storage areas.</p>
SMALL ANIMALS	<p>Monitor buildings and grounds for small animal activity.</p> <p>Monitor buildings and grounds for access holes. Repair.</p> <p>Keep vents and windows screened and screens in good repair.</p> <p>Maintain sanitation.</p>	<p>Look for live or dead animals, droppings, tracks.</p> <p>Fill holes down to 1/2", look for gaps in doors, holes in vents, holes around pipes & wires, holes & gaps that would allow small animals to get under buildings.</p> <p>See above under rodents.</p>
STANDING WATER, MOISTURE	<p>Monitor areas with standing water problems.</p> <p>Keep drains clean so water flow is unimpeded.</p> <p>Correct improper grading that leads to standing water.</p>	<p>Look for soft wood, fungus, evidence of termites. Eliminate earth to wood contact.</p>

RECORD KEEPING OPTIONS

We recommend that monitoring data be recorded and kept at the school site. All non-chemical pest control actions should also be recorded and kept on site.

COSTS ASSOCIATED WITH ADOPTING RECOMMENDATIONS

1. Building maintenance/pest-proofing
 - materials such as caulk, hardware cloth, screen, weather-stripping, etc.
 - labor
 - cost of consultation with engineer and pest control professional for earthquake joints on portables.
 - periodic monitoring (1 or 2 man-hours per quarter) for pests and/or situations that might lead to pest problems (holes, signs of birds, small mammals, or insects outside and inside, etc.)
2. Sanitation
 - plastic trash can liners
 - covers for current trash cans or new trash cans with covers
 - labor for washing outdoor lunch area
 - no costs should be incurred to improve cleanliness of dumpster other than time to persuade sanitation company to clean or replace dumpster more frequently
3. Moisture management
 - quarterly monitoring
 - labor for maintaining outside drains
 - labor and equipment to correct grading and drainage problems

4. Duct work
 - cost of consultation
 - repairs, if any

Miller Creek School: Recommendations for Integrated Pest Management Training

Hands-on workshops emphasizing the following topics are recommended.

- Inspecting buildings and grounds for structural pests and situations that lead to structural problems
- Record-keeping for IPM programs
- Pest-proofing techniques and preventive pest management for structural pests

EVALUATION OF CURRENT PEST MANAGEMENT PRACTICES

San Marin High: Key Pests

ARGENTINE ANTS

- Argentine ants have been the most problematic pest at this school site.

Ant Management, Current Practices

- Staff have effectively used sanitation (emptying trash containers).
- Applications of microencapsulated diazinon (PT265A) are made when ant invasions become chronic.

PEST BIRDS

- Pest birds, namely feral pigeons and sparrows, were observed to be nesting on the tops of structural supports along the exterior of all structures.
- Food is abundantly available not only at the school site but also at the horse ranch across the street.

Pest Bird Management, Current Practices

- Sanitation (emptying trash containers).
- Hardware cloth barriers.

RODENTS

- Rodent (mouse & rat) activity was observed throughout the campus.
- The potential for rodent problems was evident as a number of vent screens need to be repaired, replaced, or installed along exterior perimeters of various structures.

Rodent Management, Current Practices

- Sanitation (emptying trash containers).
- Building maintenance

SMALL ANIMALS

- Small animals such as skunks, raccoons and opossums could be problematic as a number of areas around the perimeter of structures have access areas large enough for these animals to get in and take up residence.

STANDING WATER

- Standing water problems caused by improper grade levels or poorly functioning drainage systems were observed in many areas of the school campus. These conditions are conducive to termite and fungus growth that can eventually become a major cause of structural problems.

San Marin High: Tolerance for Key Pests

School staff takes pest problems seriously as trash containers are emptied as needed; food debris containers are equipped with plastic liners and are emptied on a daily basis. Recycling containers are emptied on a once-weekly schedule.

RECOMMENDATIONS

San Marin High: Recommendations on Building Maintenance

Library

- North side: Hole in the siding should be sealed (stuffed with apples at time of inspection.)
- West side: Access hole above men's restroom found which allows small birds to enter the structure.
- A faucet was leaking along the west side of structure.
- All doors should be checked to determine that they are fitted with proper weather-stripping and pest-proof thresholds.
- East side: Water damage to structure was evident.

Portables, T1 - T3

- North and east side of structure: Rodent activity underneath.
- The entire perimeter of structure should be trenched and lined with 1/4" hardware cloth to prevent rodent access (ground squirrels and rats).

Fine Arts, A1-H2

- East side: A water leak was observed in the cooling unit.

Portables, 601 - 603

- South side: Open access under structures.
- The south side perimeter of structure should be trenched and lined with 1/4" hardware cloth to prevent rodent access (ground squirrels and rats.)
- Earth to wood contact was evident.

Student Center

- Southeast side: Rodents (90% gopher/10% rats) were observed to be active and burrowing under the structure. Design allows food traffic and erosion to wear away earth mound around building.

Gymnasium

- Feral pigeons roosting and nesting under the eave overhang of the entire structure. Recommend that barriers be installed to prevent access for the pigeons.

500 Building

- Feral pigeon and sparrows observed to be active and nesting on the structure.

400 Building

- Feral pigeons and sparrows observed to be active and nesting on the structure.
- Seal opening (2") adjacent to front entry of room 410.

Administration

- Feral pigeons observed to be active and nesting along the east side (front) of structure.

NOTE: In some areas, barriers to pigeons already exist but the gap between the hardware cloth and the concrete or wood beams is large enough to allow sparrows to get in. Gaps should be no larger than 1/2".

San Marin High: Recommendations on Alternative Management for Key Pests

ARGENTINE ANT MANAGEMENT RECOMMENDATIONS

- Maintain sanitation measures.

- Keep cracks and crevices sealed, especially those leading to the outside.
- Use diatomaceous earth or silica gel in wall voids or as a crack and crevice treatment.
- When ants are a serious problem, use ant bait stations containing boric acid, borax, hydramethylnon, or fipronil. Always set bait stations in the ant trail, but out of sight and reach of children. If this is not possible, use at night or on weekends and remove when children are in school. In any case, remove bait stations when ant trail has disappeared so as not to attract more ants to the spot.

PEST BIRD (PIGEON & SPARROW) MANAGEMENT RECOMMENDATIONS

- Discourage the feeding of birds anywhere on the school site. Posting signs may enhance public awareness.
- All access points to nesting sites should be sealed to prevent bird access.
- Install bird-proof barriers which are designed to prevent both pigeon and sparrow access to preferred nesting sites

RODENT MANAGEMENT RECOMMENDATIONS

- Regularly monitor buildings and grounds for rodent activity.
- Regularly monitor buildings and grounds for rodent access holes and repair.
- Keep vents screened and screens in good repair.
- Maintain sanitation measures.

SMALL ANIMAL MANAGEMENT RECOMMENDATIONS

- Regularly monitor buildings and grounds for small animal activity.
- Regularly monitor buildings and grounds for small animal access holes and repair.
- Keep vents screened and screens in good repair.
- Maintain sanitation measures.

MOISTURE MANAGEMENT RECOMMENDATIONS

- Regularly monitor areas with standing water problems. Look for soft wood, fungus, and evidence of termite activity.
- Keep drains clean so water flow is not impeded.
- Correct improper grading that leads to standing water.

**ALTERNATIVE CONTROL RECOMMENDATIONS FOR KEY PESTS
AT SAN MARIN HIGH SCHOOL**

<u>KEY PEST</u>	<u>ALTERNATIVE CONTROLS</u>	<u>GUIDELINES</u>
ARGENTINE ANTS	Maintain sanitation.	Use plastic liners in trash cans and replacing liners after emptying cans. Steam clean outdoor lunch area monthly in warmer months, less frequently in winter.
	Seal cracks & crevices	Especially cracks leading to the outside.
	Use diatomaceous earth or silica gel in wall voids or as crack and crevice treatment	Long-lasting treatment that can prevent other crawling insects.
	For serious invasions use ant baits.	Use baits containing boric acid, borax, hydramethylnon, or fipronil. Place on trail but out of sight and reach of children.
PEST BIRDS (SEAGULLS & SPARROWS)	Discourage the feeding of birds anywhere on campus.	Posting signs may enhance public awareness.

<u>KEY PEST</u>	<u>ALTERNATIVE CONTROLS</u>	<u>GUIDELINES</u>
PEST BIRDS (SEAGULLS & SPARROWS) (cont.)	Seal access to all nesting sites.	
	Install bird-proof barriers that are designed to prevent both pigeon and sparrow access to preferred nesting sites.	NOTE: In some areas, barriers to pigeons already exist but gaps between the hardware cloth and the concrete or wood beams are large enough to allow sparrows to get in. Gaps should be no larger than 1/2".
RODENTS	Monitor buildings and grounds for rodent activity.	Rodent activity = live or dead animals, droppings, gnawing, grease marks, runs, burrows, tracks.
	Monitor buildings and grounds for rodent access holes. Repair.	Fill holes down to 1/2", look for gaps in doors, holes in vents, holes around pipes & wires, etc.
	Keep vents and windows screened and screens in good repair.	
	Maintain sanitation.	Dumpster should be cleaned monthly in warmer months. Ask sanitation company to clean or replace dumpster. Minimize clutter in storerooms and classroom storage areas.
SMALL ANIMALS	Monitor buildings and grounds for small animal activity.	Look for live or dead animals, droppings, tracks.
	Monitor buildings and grounds for access holes. Repair.	Fill holes down to 1/2", look for gaps in doors, holes in vents, holes around pipes & wires, any other holes & gaps that would allow small animals to get under buildings.
	Keep vents and windows screened and screens in good repair.	
	Maintain sanitation.	See above under rodents.
STANDING WATER, MOISTURE	Monitor areas with standing water problems.	Look for soft wood, fungus, evidence of termites. Eliminate earth to wood contact. Repair leaks.
	Keep drains clean so water flow is unimpeded.	
	Correct improper grading that leads to standing water.	

RECORD KEEPING OPTIONS

We recommend that monitoring data be recorded and kept at the school site. All non-chemical pest control actions should also be recorded and kept on site.

COSTS ASSOCIATED WITH ADOPTING RECOMMENDATIONS

1. Building maintenance/pest-proofing
 - materials such as caulk, hardware cloth, screen, weather-stripping, etc.

- labor
 - possible consultation with engineer and pest control professional on pest-proofing base of Student Center structure
 - periodic monitoring (1 or 2 man-hours per quarter) for pests and/or situations that might lead to pest problems (holes, signs of birds, small mammals, or insects outside and inside, etc.)
2. Sanitation
- covers for current trash cans or new trash cans with covers
 - no costs should be incurred to improve cleanliness of dumpster other than time to persuade sanitation company to clean or replace dumpster more frequently
3. Moisture management
- quarterly monitoring
 - labor for maintaining outside drains
 - labor and equipment to correct grading and drainage problems
4. Pest bird management
- materials for bird proofing
 - labor

San Marin High: Recommendations for Integrated Pest Management Training

Hands-on workshops emphasizing the following topics are recommended.

- Inspecting buildings and grounds for structural pests and situations that lead to structural problems
- Record-keeping for IPM programs
- Pest-proofing techniques and preventive pest management for structural pests

Pest Management Perceptions and Needs Assessment

MODEL INTEGRATED PEST MANAGEMENT PLAN FOR SCHOOLS

ASSESSMENT OF CURRENT PEST MANAGEMENT PERCEPTIONS

AND AN ASSESSMENT OF NEEDS AT THREE MARIN COUNTY SCHOOLS:

Bacich Elementary School, Miller Creek Middle School, and San Marin High School

Report prepared by Phil Boise
Community Environmental Council
930 Miramonte Drive
Santa Barbara, CA 93109
(805) 963-0583; (805) 962-9080 Facsimile

Assessment dates: January - February 2001

Assessment by: Phil Boise

Assessment Goals

- Obtain general information about perceptions and needs of focus groups
- Assess factors that fall outside of structures and landscape and that deal primarily with personnel and policy
- Identify needs among these groups and in the areas of policies and practices

Assessment Procedure

The primary focus groups interviewed included school board members, administrators, teachers, students, and parents.

The assessment tools used to gather information from these focus groups included a written survey, focus group interviews, and key informant interviews.

Written Survey

A survey was developed with 45 questions covering five primary topics: current pest management policies, organizational structure, control methods, training, and changing pest management practices.

A total of 43 surveys were returned:

Staff (any respondent employed by a school district):	28 total
5 district and site custodians	
7 district and site grounds and maintenance	
7 teachers	
4 principals	
1 superintendent	
1 classified position	
1 listed as "rsp"	
2 of unknown job description	

Non-staff (any respondent not employed by a school district): 15 total
13 parents
1 trustee
1 student (high school)

Focus group interviews

These were conducted to gain further insight into the needs and perceptions of the target groups. One meeting was held with the maintenance directors from each of the three target schools, and one meeting was held with sixteen parents.

Key informant interviews

Interviews with the maintenance directors of the three target schools were conducted via telephone.

Conclusions

The highest priorities regarding the needs and perceptions of the target groups could be summarized as communication, information, and risk reduction. The majority of all respondents said they would change their current system in order to reduce the risk associated with pest management. The barriers and incentives associated with this are primarily functions of communication and information.

Observations and Recommendations: Incentives to Change and Barriers to Implementing IPM

Incentives to Change

Without question, the majority of respondents consider “reduction of risk” the most compelling reason to change their current pest management system.

Sixty-three percent of school employees said they would change their system to improve efficiency and oversight. Forty-one percent of school personnel would like to reduce the time spent managing pests.

The community feels that its needs and concerns should be addressed in the operation of the schools, and that meeting these needs and concerns is a compelling reason to change the current pest management system of the school.

Saving money and reducing liability did not rank highly as compelling reasons to change the current system.

Barriers

The non-staff community perceives that the school staff community is unwilling to implement IPM because of feared increases in labor and materials cost, and a compromise to aesthetic standards.

In truth, the highest percentage of school staff (41%) listed “don’t know” as the greatest barrier to implementing IPM. The school staff did indicate that it has discomfort with the lack of “technical information and support,” and with the “efficacy and availability of low-risk materials and practices.”

“Cosmetic compromise” ranked as the number 5 barrier (with 1 being the most important barrier) for school staff. A potential “increase in labor” ranked as number 7, and not a single school employee indicated that an “increase in cost” might be a barrier to implementing IPM.

Recommendations:

“Cost” and “cosmetics” are barriers that may be overcome with training. Training components should include the following:

- A discussion of potential short- and long-term fiscal impacts of IPM, including indirect expenses such as pesticide application posting, notification, and record-keeping.
- For comparison purposes, transition expenses (including training) from conventional pest management to IPM should be applied to the conventional pest management budget. These are costs that are incurred because of conventional pest management practices. Schools with strong and functional IPM programs will not be incurring such expenses.

- A discussion, including a slide show, portraying diverse site management practices with high cosmetic standards. This information may be useful for site managers, grounds employees, and the non-staff community to illustrate the subjective nature of site aesthetics and cosmetic standards.

Observations and Recommendations: Training

The most frequently requested topic of training was “Health effects of pesticides,” a topic which is typically not included in most training components. Training in alternative pest management practices is clearly desired. Most teachers indicated a desire to put out insecticidal bait stations in their own classrooms, but were unwilling to participate in 10 hours of associated training. Non-teachers generally thought that teachers should not be placing insecticidal bait stations.

Recommendations

Teachers should be given some pest prevention tools and training to address immediate pest problems, and to allay the temptation to apply their own pesticides.

Twenty-minute training packages could be developed to present at staff and administrative meetings addressing the following:

- Health effects of pesticides
 - Toxicity classifications (acute and chronic toxicity; carcinogens, reproductive toxicants, endocrine disrupters, neurotoxins), how they are determined, and by whom
 - Inert ingredients
- How to seek out toxicological information
- How to identify pest problems and habitats
- Non-chemical pest management practices that may be implemented in the classroom
- Office/classroom sanitation
- Minor structural improvements
- Evaluating various cosmetic standards and needs
- The subjective nature of a “pest”

Included in the training package could be laminated instructions for identifying and preventing specific pests and monitoring sheets to record observations and management activities.

Teachers and staff need appropriate tools for “first-strike” pest management. Each could be given a “classroom ant tool box” containing a spray bottle with soapy water for wiping up ants, plastic containers with snap-on lids for food storage, masking tape to create “food islands” or food isolation tables (masking

Observations and Recommendations: Training Scheduling

No clear pattern emerged in the desired number or duration of training sessions. Most respondents felt that all stakeholder groups should receive training. No respondents listed “lack of interest on the part of the administration to provide training” as a barrier. Continuing education credits were noted by 30% of the staff respondents as an incentive for training.

Recommendations:

The possibility of offering continuing education credits that would contribute towards a teacher’s accreditation or advancement should be explored. This will provide the incentives to overcome barriers of scheduling and low interest. Training components should be broken into 20-minute blocks, allowing better access to regularly scheduled staff and administrative meetings.

Observations and Recommendations: Budget

A charge of this study was to gather budget figures from each school for all areas connected with pest management. In the focus group interviews and the key informant interviews however, it became clear that this would be extremely difficult. These expenses are not categorized under pest management line items, but instead are

represented under pest management, custodial, maintenance, and other expense categories. These expenses are distributed between district and site budgets and between in-house and contract activities.

Since IPM is in fact an integration of many non-chemical management practices, it would be difficult to extract the labor costs of normal maintenance activities that may have a direct or indirect impact on pest populations. Examples of these would include sanitation, structural repairs, or landscape activities, all of which have an effect on pest populations, but could not be isolated as pest management expenses.

Recommendations

There is a need for an in depth study on the costs of IPM versus conventional pest control.

Observations and Recommendations: Satisfaction with the Current Pest Management System

Satisfaction with the current pest management system shows great room for improvement, with satisfaction among school staff scoring at 2.5, with 1 as excellent and 5 as poor. This, coupled with the high response of staff who see “improving efficiency and oversight” as a compelling reason to change the current system, indicate that the efficiency, decision-making process, and oversight of IPM may appeal to many school staff.

Another interesting point brought to light by the survey is that there is great disparity between the perceived risks of pesticides in the schools.

Recommendations:

Make the training concerning “Health effects of pesticides” available to parents as well as staff to address the disparity in the perception of risk. This may move both sides closer together in their understanding and management of risk, the core of the IPM debate.

Summary of Perceptions and Needs Assessment in Three Marin County Schools

School Name	Anthony Bacich Elementary	Miller Creek Middle	San Marin High
School District	Kentfield	Dixie	Novato
Survey Responses	<u>20 total</u> 1 superintendent 1 principal 1 custodian 1 teacher 1 maintenance/grounds 1 unknown 13 parents 1 trustee	<u>7 total</u> 3 principals 2 custodians 2 maintenance/grounds	<u>16 total</u> 6 teachers 2 district grnds/maint 2 SMHS grounds 2 SMHS custodians 1 SMHS classified 1 SMHS RSP 1 SMHS student 1 unknown
CURRENT POLICIES			
IPM policy?	In process	In process	In process
IPM Admin. Guidelines?	In process	In process	Yes
Written IPM guidebook?	No	No	Yes

Pesticide material review and approval process?	No	No	Yes
Registry of chemically sensitive/special concern?	School site level	School site level	School site level
Pesticide applications posted Prior to application After application	72 hours 72 hours - week	No No	No No
ORGANIZATIONAL STRUCTURE			
IPM coordinator?	Paul Miller, acting	Tim Walsh, acting	Ron Warfield, IPM Program Administrator
Pest management activities carried out at what level?	District staff	District staff	District staff
IPM Committee with community involvement?	Yes	No	No

School Name	Anthony Bacich Elementary	Miller Creek Middle	San Marin High
School District	Kentfield	Dixie	Novato
Who monitors?	Site / district staff during routine activities	Site / district staff during routine activities	District pest control staff
Who decides when and how to manage pests (<i>Sets tolerance thresholds/determines action</i>) Non-chemical control Chemical control	School site staff (principals, teachers, custodians) Paul Miller	School site staff (principals, teachers, custodians) Tim Walsh	District pest control staff, school site staff Ron Warfield (primary), field technicians (secondary)
Who takes action? Non-chemical control Chemical control	School site staff (principals, teachers, custodians)	School site staff (principals, teachers, custodians) Licensed applicators (<i>outdoors only, no pesticides indoors except emergency contract work</i>)	District pest control staff, school site staff District pest control staff ONLY.

Who is authorized to apply pesticides?	District grounds / maintenance staff Contract PCO's (<i>stinging pests only</i>)	Licensed applicators Contract PCO's / Mosquito Abatement (<i>stinging pests only</i>) Services contracted by non-district organizations (<i>maintain baseball infields</i>)	District pest control staff ONLY.
Who authorizes pesticide applications	Paul Miller	Tim Walsh Non-district organization contractor	Ron Warfield

School Name	Anthony Bacich Elementary	Miller Creek Middle	San Marin High
School District	Kentfield	Dixie	Novato
CONTROL METHODS			
Primary pests: Indoors Secondary	Ants, spiders, flies, mice, head lice, mice Termites, rodents, dust mites		
Primary pests: Outdoors Secondary	Yellowjackets/bees, weeds, ants, gophers Ground squirrels, rodents, tree pests, mole, grubs		
When pesticides applied:	After hours/weekends/ vacations (6); varies with need (1)	After hours/weekends/ vacations (3); varies with need (2) Unoccupied areas during school hours (1)	After hours/weekends/ vacations (6); Don't know (5); varies with need (3); Unoccupied areas BEFORE school hours (1)
"If ants invade your office / classroom, how do you proceed?"	#1: Notify appropriate people of the problem and wait for help #2: Notify appropriate people of the problem and take action on your own		
	ACTIONS TAKEN: Sanitation: (Empty garbage/clean up items attracting ants/clean up ant trail) <i>Only Responses Listed</i>		

TRAINING			
Current training	As needed	As needed to satisfy continuing education requirements for applicator's license/certificate	Regularly
Who receives	Varies	Applicator license / certificate holders	All grounds staff, Maint. and Operations Coordinator and Manager

School Name	Anthony Bacich Elementary	Miller Creek Middle	San Marin High
School District	Kentfield	Dixie	Novato
Where go for information	Vendors Internet Seminars	Seminars	Vendors, seminars, internet, journals, peers
Training information should be presented as:	#1: Printed/fact sheets #2: Training sessions #3: Web links		
Which groups should be trained:	All		

CONTRACT SERVICES			
	High pest risk only (termites, bees, yellowjackets - pco)	High pest risk only (termites – pco; stinging – vector control) Non-district baseball clubs contract out maintenance of infields, probably includes herbicides	Exclusion procedures only No contract pesticide applications Spraying is strictly prohibited by outside contractors. Proper cultural practices are encouraged to avoid the need for pesticides.

RECORD KEEPING			
Form in which records kept		Monthly use reports	District work orders and Monthly use reports
District work orders			
Records kept	District office	Submitted monthly to Agricultural Commissioner; District office	District grounds office

Results from Marin School Pest Management Survey

INCENTIVES	Combined Ranking ^c 1 = greatest consequence	STAFF ^a		NON-STAFF ^b	
		% responding ^d	Weighted score ^e	% responding ^d	Weighted score ^e
<i>“In your view, which of the following would be the most compelling reasons to change your current pest management program? (1= most compelling)”</i>					
Reduce risk to students and staff	Most compelling	67%	1.8	93%	1.1
Increase efficiency and oversight of pest management operations	Second	63%	3.1	27%	9.4
Meet community concerns	Third	22%	6.8	47%	4.6
Reduce time spent managing pests	Fourth	41%	5.1	20%	18.3
Reduce cost of pest management	Fifth	30%	7.2	40%	9.6
Reduce liability associated with pest management	Sixth	29%	7.2	13%	22.5

- a) Staff: Any respondent employed by a school district. 28 total, includes district and site custodians (5), district and site grounds and maintenance (7), teachers (7), principals (4), superintendent (1), classified (1), rsp (1), unknown (2).
- b) Non-staff: Any respondent not employed by a school district. 15 total, includes trustee (1), high school student (1), parents (13).
- c) Combined Ranking: Average of staff and non-staff weighted scores.
- d) % Responding: Percent of target group that answered the question.
- e) Weighted Score: Represents average score per respondent, and accounts for variations in response rates between questions. Derived by dividing the average score by the percent of target group answering question.

Observations of the consultant:

- (1) Without question, the majority of respondents recognize the reduction of risk as the most compelling reason to change their current pest management system.
- (2) 63% of school employees would change their system to improve efficiency and oversight.
- (3) The community feels that it’s needs and concerns should be addressed in the operation of the schools, and that meeting these needs and concerns is a compelling reason to change the current pest management system of the school.
- (4) 41% of school personnel would like to reduce the time spent managing pests.
- (5) Saving money and reducing liability did not rank highly as compelling reasons to change the current system.

BARRIERS	Combined Ranking ^c 1 = greatest consequence	STAFF ^a		NON-STAFF ^b	
		% responding ^d	Weighted score ^e	% responding ^d	Weighted score ^e
“Which of the following factors do you think limits the use of least-toxic pest control at your school or in your district? (1= most compelling)”					
Lack of technical information and / or support	Most compelling	30%	5.5	47%	5.8
Efficacy of low-risk material / practices	Second	22%	7.5	40%	6.7
Don't know	Third	41%	2.5	7%	15
Availability of low-risk materials / practices	Fourth	15%	8.4	20%	11.7
Compromise to cosmetic standards	Fifth	11%	18	67%	3.2
Difficulty in comparing risks of different chemical and non-chemical practices	Sixth	7%	13.5	40%	7.9
Anticipated increase in the cost of labor	Seventh	7%	27	60%	3.1
Anticipated increase in the cost of materials	Eighth	0%	0	53%	4.0

- a) Staff: Any respondent employed by a school district. 28 total, includes district and site custodians (5), district and site grounds and maintenance (7), teachers (7), principals (4), superintendent (1), classified (1), rsp (1), unknown (2).
- b) Non-staff: Any respondent not employed by a school district. 15 total, includes trustee (1), high school student (1), parents (13).
- c) Combined Ranking: Average of staff and non-staff weighted scores.
- d) % Responding: Percent of target group that answered the question.
- e) Weighted Score: Represents average score per respondent, and accounts for variations in response rates between questions. Derived by dividing the average score by the percent of target group answering question.

Observations of the consultant:

1. The non-staff community thinks that the school staff community doesn't want to implement IPM because it fears increases in labor and materials cost, and a compromise to cosmetic standards.
2. In truth, the highest percentage of school staff (41%) 'Don't know' as the greatest barrier to implementing IPM. The school staff did indicate that it has discomfort with the lack of 'technical information and support', and the 'efficacy and availability of low-risk materials and practices'.
3. 'Cosmetic compromise' ranked as the number 5 barrier for school staff. A potential 'increase in labor' ranked as number 7, and not a single school employee indicated that an 'increase in cost' might be a barrier to implementing IPM.

Recommendations:

1. 'Cost' and 'cosmetics' are barriers that may be overcome with training.
2. Training components should include:
 - A. A discussion of potential short and long term fiscal impacts of IPM, including indirect expenses such as pesticide application posting, notification, and record-keeping.
 - B. Transition expenses (including training) from conventional pest management to IPM should be applied to the conventional pest management budget for comparison purposes. These are costs that are incurred because of conventional pest management practices. Schools with strong and functional IPM programs will not be incurring such expenses.
 - C. A discussion, including a slide show, portraying diverse site management practices with high cosmetic standards. This information may be useful for site managers, grounds employees, and the non-staff community to illustrate the subjective nature of site aesthetics and cosmetic standards.

TRAINING FOCUS	Combined Ranking ^c 1 = greatest consequence	STAFF ^a		NON-STAFF ^b	
		% responding ^d	Weighted score ^e	% responding ^d	Weighted score ^e
<i>"If you were required to change your activities to improve the current pest management system, please rank which you would be willing to change, from first to last?"</i>					
Participate in more training	Most willing	56%	3.0	40%	5.4
Take responsibility for improved sanitation in my own office/classroom	Second	44%	8.9	13%	15
Change my cosmetic standards for the school site	Third	15%	20.3	27%	9.4
Increase the budget	Fourth	19%	16.2	13%	15
Take responsibility for minor structural improvements (such as caulking) in my office/classroom	Fifth	26%	8.8	13%	22.5
Tolerate more pests, as long as they were not causing health or cosmetic damage	Sixth	11%	18	27%	4.7
Tolerate more pesticides	Seventh	11%	30	7%	15
None of the above	Eighth	11%	15	0	0

- a) Staff: Any respondent employed by a school district. 28 total, includes district and site custodians (5), district and site grounds and maintenance (7), teachers (7), principals (4), superintendent (1), classified (1), rsp (1), unknown (2).
- b) Non-staff: Any respondent not employed by a school district. 15 total, includes trustee (1), high school student (1), parents (13).
- c) Combined Ranking: Average of staff and non-staff weighted scores.
- d) % Responding: Percent of target group that answered the question.

- e) **Weighted Score:** Represents average score per respondent, and accounts for variations in response rates between questions. Derived by dividing the average score by the percent of target group answering question.

DESIRED TRAINING TOPICS		
<i>“Which topics should be part of the training.”</i>	First	Health effects of pesticides
	Second	How to identify and prevent pest problems
	Third	Non-chemical pest management practices you can implement
	Tie	Pest management practices used at your school (Policy)
	Tie	Safety risks from pests
	Tie	Pesticide handling safety training

PERCEIVED BARRIERS TO TRAINING		
<i>“Which factors would be most likely to prevent your school or district from providing training on pest management to all school or district employees?”</i>	First	Scheduling problems
	Second	Lack of interest on the part of teachers and staff to receive training
	Third	Cost

Training Topics:

Observations of the consultant:

1. The most highly requested topic of training was ‘Health effects of pesticides’, a topic which is typically not included in most training components.
2. Training in alternative pest management practices is clearly desired.
3. Alternative pest management practices should be prioritized as indicated in the “Desired Training Topics” table, and the “Training Focus” table.
4. Most teachers indicated a desire to put out insecticidal bait stations in their own classrooms, but were unwilling to participate in 10 hours of associated training.
5. Non-teachers generally thought that teachers should not be placing insecticidal bait stations.
6. Teachers should be given some pest prevention tools and training to address immediate pest problems, and to allay the temptation to apply their own pesticides.

Recommendations:

1. Develop 20 minute training packages with information and materials for staff and administrative meetings addressing:
 - Health effects of pesticides:
 - Toxicity classifications (acute and chronic toxicity; carcinogens, reproductive toxicants, endocrine disruptors, neurotoxins);
 - How they are determined, and by whom;

- Inert ingredients;

How to seek out toxicological information

How to identify pest problems and habitats.

Non-chemical pest management practices that may be implemented on the class level.

- Office/classroom sanitation
- Minor structural improvements
- Evaluating various cosmetic standards and needs
- The subjective nature of a 'pest'.

2. Include in the training package:

Laminated instructions for identifying and preventing specific pests

Monitoring sheets to record observations and management activities

3. Develop a 'classroom ant tool box' comprised of:

A spray bottle with soapy water,

Tuperware,

Masking tape to create 'food islands', or isolated tables with ant barriers used to store and handle food.

Training Scheduling:

Observations of the consultant:

1. No clear pattern emerged in terms of the number or duration of training sessions.
2. Most respondents felt that all stakeholder groups should receive training.
3. No respondents listed "Lack of interest on the part of the administration to provide training" as a barrier.
4. Continuing Education credits were noted by 30% of the staff respondents as an incentive for training.

Recommendations:

1. Explore the possibility of offering continuing education credits that would contribute towards a teacher's accreditation or advancement. This will provide the incentives to overcome barriers of scheduling and low interest.
2. Break training components into 20-minute blocks, allowing better access into regularly scheduled staff and administrative meetings.

SATISFACTION WITH CURRENT PEST MANAGEMENT SYSTEM	Combined Ranking ^c 1 = greatest consequence	STAFF ^a		NON-STAFF ^b	
		% responding ^d	Weighted score ^e	% responding ^d	Weighted score ^e

<p>“How would you rate the overall pest management program in your school or district?”</p> <p>Excellent = 100% Poor = 1%</p>		100%	50%	100%	38%
<p>“How do you perceive the health risk from pests in your school or your district?”</p> <p>Low Risk = 100% High Risk = 1%</p>		100%	100%	100%	63%
<p>“How do you perceive the risk from pesticide and/or herbicide exposure in you school or district?”</p> <p>Low Risk = 100% High Risk = 1%</p>		100%	100%	100%	23%

- a) Staff: Any respondent employed by a school district. 28 total, includes district and site custodians (5), district and site grounds and maintenance (7), teachers (7), principals (4), superintendent (1), classified (1), rsp (1), unknown (2).
- b) Non-staff: Any respondent not employed by a school district. 15 total, includes trustee (1), high school student (1), parents (13).
- c) Combined Ranking: Average of staff and non-staff weighted scores.
- d) % Responding: Percent of target group that answered the question.
- e) Weighted Score: Represents average score per respondent, and accounts for variations in response rates between questions. Derived by dividing the average score by the percent of target group answering question.

Observations of the consultant:

1. Satisfaction with the current pest management system shows great room for improvement, with satisfaction among school staff scoring at 2.5, with 5 as excellent (50% satisfaction). This, coupled with the high response of staff who see ‘improving efficiency and oversight’ as a compelling reason to change the current system, indicate that the efficiency, decision-making process and oversight of IPM may appeal to many school staff.
2. There is great disparity between the perceived risks of pesticides in the schools.

Recommendations:

1. Make the same training concerning ‘Health effects of pesticides’ available to parents as to staff to address the disparity in the perception of risk. This may move both sides closer together in their understanding and management of risk, the core of the IPM debate.

Appendix C

- **Outreach Letter to Maintenance Directors**
- **Structural IPM Training Flyer**
- **Landscape IPM Training Flyer**

Outreach Letter to Maintenance Directors

Letter was sent to all school maintenance directors in Marin County to remind them of our project and to invite them to attend the structural and landscape IPM trainings.

June 14, 2001

Dear

As you may know, last year the California Legislature passed the "Healthy Schools Act of 2000" which encourages the use of IPM (Integrated Pest Management) in California schools. Last summer, the Marin County Department of Agriculture received a grant from the California Department of Pesticide Regulation to develop a "Model Integrated Pest Management Plan." This model plan will help address the challenges for schools in adopting an IPM program.

Three Project Phases

Phase I: Assess current pest management practices in three Marin County schools (Bacich Elementary, Miller Creek Middle School, and San Marin High). This phase has been completed.

Phase II: Conduct IPM training for school personnel in Marin County. The most intensive training is designed for maintenance and grounds personnel, but we will also hold informational meetings for your superintendent, school board members, teachers, and parents.

Phase III: Organize an "IPM Exposition" for school personnel, pest control operators, and others. You should be receiving information soon. Date: July 18, 9am to 3pm at San Marin High in Novato.

Invitation to Training Workshops

I would like to invite you to a 3-hour workshop on structural pest management (ants, rodents, birds, and roaches) and a series of four 2-hour workshops on landscape pest management. We would like you, your custodians, and anyone who repairs buildings to attend the structural pest management workshop, and we would like you and your groundskeepers to attend the landscape training.

These workshops will be taught by IPM experts and will include both classroom time and hands-on field training. I am confident that you will find the information extremely useful in your job.

I understand that this kind of extensive training might be an unusual commitment for you and your staff. If you perceive obstacles to allowing your staff to attend, I am ready to assist you in any way I can to reinforce the importance of these workshops to your school district.

IPM is becoming the preferred method of pest management in California schools, and these workshops will help you and your staff stay informed about the latest techniques and products.

Flyers

I have enclosed a set of flyers for each training program for you to post, and I have also included masters for each flyer from which you can make your own copies to distribute to individuals.

If you have any questions, or need help distributing your flyers, please call my project coordinator, Tanya Drlik at 510-524-8404.

Sincerely,

Stacy K. Carlsen
Agricultural Commissioner
Director of Weights and Measures
cc: Mary Jane Burke, County Superintendent

Structural IPM Training Flyer

Landscape IPM Training Flyer

Appendix D

- **Training Outline: Structural IPM in Marin County Schools**
- **Summary of Evaluations: Structural IPM Training**

Training Outline: Structural IPM in Marin County Schools

Date and Place: July 23, 2001, San Marin High School, 15 San Marin Dr., Novato, CA

Time: 9am to Noon

Speakers: Mike Wolf and Dan Lepez of IPM BioCare in San Rafael, CA

Note: IPM product displays from a number of vendors will be on view.

8:30 to 9:00 Registration confirmation and sign in

9:00 to 9:50 Introductory Session

1. What is the Healthy Schools Act of 2000 and how does it affect you
 - a. Designating an IPM Coordinator
 - b. Annual pesticide product notification of staff and parents
 - c. Maintaining a registry of staff and parents
 - d. Posting warning signs when pesticides are applied
 - e. Exemptions from posting
 - f. Record keeping requirements
2. IPM—What it is and what it isn't
 - a. IPM is a problem-solving process.
 - b. Monitoring (or information gathering) is used to determine if and when the pest problem should be treated.
 - c. Record keeping allows you to fine tune your pest management process and allows you to transfer accurate information from one employee to another.
 - d. Knowing the biology and habits of a pest will give you an edge in controlling that pest. Biological information helps you formulate a multifaceted approach to control.
 - e. IPM involves detective work to solve problems.
 - f. IPM is not a monthly chemical treatment program, not even one that rotates through a number of chemicals.
 - g. IPM is not substituting less-toxic chemicals for more toxic chemicals. IPM allows an IPM Coordinator to choose from a broad range of techniques, devices, and chemicals to solve a problem.
 - h. IPM strives to change the circumstances that lead to pest problems, Business and maintenance practices and sometimes even architecture may require modification in order to provide more permanent solutions to pest problems.
3. Prevention—How to avoid structural pest problems
 - Exclusion
 - a. Exclusion is the first step in IPM or any careful pest management program.
 - b. Your job will be easier once you do pest proofing, your buildings occupants more satisfied, and your solutions to pest problems more permanent.
 - c. A thorough inspection is necessary to find problem areas.
 - d. Materials to use
 1. What's available
 2. Considerations for specific pests
 - Sanitation
 - a. Sanitation is the second part of prevention
 - b. Clean up food wastes promptly—no food wastes in garbage cans overnight
 - c. Work with teachers to help them understand how projects involving food in the classroom attract pests. If possible, work for a ban on food-based art projects.

- d. Removing clutter eliminates hiding places

9:50 to 10:00 Break

10:00 to 10:55 Building Inspection Session

Participants will be led through a thorough on-site inspection to understand how to inspect a building for structural pests. Participants will be divided into 2 groups to allow for more interaction.

11:00 to 12:00 Pest Management Session for Ants, Rodents and Birds

1. Pest biology—life cycle, food preferences, habitat preferences, important facts needed for controlling them.
2. Monitoring for the pest (both tools and tactics)
3. Keeping records of monitoring and treatments and why it is important to do so.
4. Sanitation/Prevention and tips for getting clients to cooperate in this
5. Non-chemical and physical controls (including tools and devices)
6. Least-toxic chemical controls including how to limit exposure to students and staff, and how to keep material from going down the sanitary drain or the storm drain (e.g. using baits and not sprays, monitoring to determine where the problems really are and using chemical controls only where needed, etc.).
7. Questions and answers

Noon Dismissal

Summary of Evaluations: Structural IPM Training

Mike Wolf, July 23, 2001

QUESTIONS (Participant comments or additions are in quotes)	RESPONSES (53 attended, 25 Eval. returned)	NO ANSWER
1. What part of the workshop was most useful to you?		3
Lecture with Mike Wolf		
Guided inspection with Dan Lepez	4	
Other: "Both"	17	
Other: "Proper way to use pesticide"	1	
2. What would you like to hear more about? (Check all that apply.)		2
a. Healthy Schools Act and how it will affect you	11	
b. What IPM is	10	
c. How to inspect buildings for pest problems or potential problems	13	
d. How to solve structural pest problems	12	
Other: "How do a. thru d. above apply to the custodian and not just the maintenance director or the IPM Coordinator?"	1	
3. The workshop was		7
Right length	10	
Too long	1	
Too short	7	
4. If the workshop was not the right length, how long do you think it should be?		1
1 hr.	0	
2 hrs.	1	
4 hrs.	3	
2 sessions of 2 hrs. each on separate days	0	
Other: "8 hrs."	1	
Other: "Long enough to fully cover issues"	1	
Other: "1 day, AM and PM"	1	

5. Were there topics we left out that should be in this kind of workshop?

 "What kind of pesticides to use"

 "Termite control and detection"

 "If we don't have the manpower, we do not have the time to inspect or put in work orders for pest control. (from San Rafael City Schools)

“Recycling problems”

“Maintenance”

“How to establish an IPM program in a school system”

6. Were there questions you didn't get answered? If so, what are they?

“What can we do as custodians in the classroom with pest problems like lice and ants.

“We need an ongoing resource to help us with specific IPM problems and issues

7. Suggestions for improving the workshop:

Five negative comments about the extensive discussion of the personnel problems at San Rafael City Schools.

“Demonstrations in the use of safety equipment”

“Power Point presentation and guided inspection should be printed and handed out at the beginning of the workshop.”

“Microphone for presenters—sometimes hard to hear”

“Workshop was excellent.”

“More short term remedies for pests”

“More personnel in the custodial department”

“It was very informative”

Appendix E

- **Training Materials for Structural IPM in Marin County Schools Workshop**

1. *Ants*
2. *Cockroaches*
3. *Rats*
4. *Spiders*
5. *Garbage Management Guidelines*
6. *Inspection Checklists*
7. *Pesticide Use, Disposal, and Storage Guidelines*

Fact Sheets for Maintenance Directors/IPM Coordinators

The following fact sheets provide information about the biology of the pests and a summary of management techniques that are compatible with an IPM program. The checklists can be used to inspect buildings for pest proofing needs and for sanitation. See links for web sites that can provide additional information.

Fact sheets were researched and written by Tanya Drlik, IPM Specialist and Project Coordinator for the Marin Model School IPM project.

Argentine Ant (*Linepithema humile*)

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Important Biological Facts

General

- The Argentine ant is not native to the U.S. It came on Brazilian coffee ships to New Orleans about 1891.
- This ant does not sting but will occasionally bite.
- Argentine ants are capable of carrying pathogenic bacteria in hospitals and food establishments.

Colonies

- This ant lives in colonies that are linked by tunnels, and Argentine ant workers move freely from nest to nest. Each colony has many queens that live in harmony. It may be more accurate to think of Argentine ants as living in huge colonies with 1000's of entrances. Some researchers consider the Argentine ants from San Diego to the Bay Area to be one vast colony.
- Because of these immense "supercolonies," the concept of finding and killing "the" nest is not always valid.
- Argentine ant queens are not just egg-laying machines, they feed and clean themselves and help care for the young. Queens can be seen walking in foraging trails (they are much larger than the workers).

Feeding Behavior

- Worker ants (all females) feed and care for the young, but they also feed each other. Up to 50% of the food they ingest is shared with fellow workers. The technical term for insects exchanging food with one another is **trophallaxis**.
- Because of trophallaxis, ant baits can affect a much larger number of ants than just those in the foraging trail that encounter and feed on the bait. On average at any one time, only about 5 to 7% of the ants in a colony are out foraging.
- Argentine ants will feed on just about anything from dead animals (including insects) to all kinds of human and pet food, to vomit, feces, and even human sputum.
- A favorite food of this ant is the honeydew produced by insects like aphids, mealybugs, scales, and whiteflies. Argentine ants protect these insects from their natural enemies. Plants that harbor these pest and are growing near a structure will attract ants to the building.
- Liquid baits with sugar as the attractant are useful throughout the year, because adult ants will always feed on sugary liquids. Baits with a protein attractant may only be useful when the colony is expanding and ants are feeding a large number of young.

Nesting sites

- Argentine ants are very mobile and can move their colonies in hours to take advantage of a food source or to escape inhospitable conditions. In winter they look for places that are warmer and drier than the surrounding area, and in summer they seek cooler and moister sites.
- They nest primarily in the ground, but they can be found nesting in unusual places including inside metal curtain rods, under tiles on kitchen counters, in wall voids, in soil accumulated in the corners of a roof, and in vehicles such as cars, buses, mobile lunch vehicles, and motor homes.

Summary of ANT Management Techniques

Compatible with an IPM Program

Education

Educate principals, teachers, and students about the effects their actions have on pest management and about the relationship between ants and food/garbage. Encourage all staff to store food in ant-proof containers (see below).

Physical/Mechanical Controls

- Exclusion
 - Building repairs
 - Caulk cracks and crevices.
 - Fill gaps around pipes, cables, and wires that pass through walls inside and outside the structure.
 - Weather-strip doors and windows.
- Vacuum up ant trails.
- Mop up ant trails with detergent and water. Supply teachers and staff with spray bottles containing detergent and water for wiping up ant trails.

Sanitation/Habitat Modification

- Inspect landscaping near structures for honeydew-producing insects (aphids, mealybugs, scales, whiteflies). Use sticky barriers on plants, control honeydew-producing insects, or remove plants.
- Use plastic liners in garbage cans and remove garbage from building before nightfall.
- Store garbage in cans or dumpsters outside the building.
- Keep interior and exterior garbage cans clean.
- Encourage policies that keep food out of the classroom.
- Limit areas where food can be eaten.
- Store food in plastic containers with snap-on lids or screw-top jars that have a rubber gasket on the lid.
- Store can or bottle recycling outside, or empty nightly to an outside container.
- Thoroughly clean food preparation and eating areas daily.
- Regularly steam clean large appliances in kitchens.

Chemical Controls (Use according to directions on product label.)

Note that new products are constantly coming on the market. Brand names listed are for example only. No endorsement of specific products is intended nor is criticism implied of similar products that are not mentioned.

PRODUCT	ACTIVE INGRED.	NOTES
Cleaning up ant trails		
Detergent and water in spray bottle	Detergent & water	Can be used in mopping solution
Orange Guard, various citrus cleaners	d-limonene	Can be used in mopping solution
Ant Baits		
Advance granular	Abamectin	
A.C.E. System bait (liquid)	Boric acid	Slow acting
Maxforce—granules and bait stations	Hydramethylnon/fipronil	Fipronil gives quicker kill
Niban (granules)	Boric acid	Slow acting
Terro (liquid)	Borax	Slow acting
Drax gel, Drax Liquidator (liquid)	Boric acid	Slow acting
Dust (use in wall voids and cracks and crevices)		
Borid	Boric acid	Slow acting
Drione	Silica gel + pyrethrin	
Timbor	Borate	Slow acting
PT239 Tri-Die	Silica gel + pyrethrin	
Perma-Dust	Boric acid	Slow acting

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German Cockroach (*Blattella germanica*)

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Important Biological Facts

- The German roach is the most common species in school kitchens.
- The German roach originated in Southeast Asia, so look for them in “tropical” locations, i.e., warm & moist.
- German roaches reproduce rapidly. Missing one pregnant female is all you need for the problem to rebound.
- German roaches are often resistant to pesticides.
- Fast killing pesticides and flushing agents will cause them to scatter and will make them harder to control.
- German roaches carry their egg cases until they hatch, so loose egg cases are usually empty.
- German roaches generally travel short distances to feed. In other words, their harborage is near where they feed.
- German roaches are usually transported accidentally from one place to another as adults because adults are most resistant to desiccation.
- Roaches have a strong need to be touched on all sides at once so they like to hide in narrow cracks and crevices.
- Roaches are rarely dispersed throughout a building. They will choose suitable harborage near a food source and stay there.
- Roaches are generally active at night and remain hidden during the day.
- A roach sheds its skin (molts) a number of times during its life. When molting, the roach remains in its harborage and doesn't feed until its new skin has hardened. During this period, gel baits may lose their attractiveness.
- Insect growth regulators (IGRs) like hydroprene (for example, Gentrol) make cockroaches hungry enough that they will feed when they otherwise would not eat. IGRs sterilize immature roaches but do not affect adults. By using baits along with IGRs you will achieve faster and more effective control.

QUESTIONS TO ASK DURING A SITE INSPECTION FOR COCKROACHES

- Which cockroach species is/are present?
The species will indicate the harborages, what the roaches may be feeding on, how fast they reproduce, what types of controls are appropriate, and where to place the controls.
- What type of site is it? What is it used for and at what times of the day?
This provides information on the number of roaches the site can support, where the roaches may be coming from, and appropriate control methods.
- Where do building occupants see pests? How many? How often? At what time of year? Are there any specimens?
This will give you clues to harborage sites and to the species of roach (or other insect) causing the problem.
- Is the problem new? Chronic? Associated with other events such as a change in suppliers? This will help to pinpoint sources of the problem and indicate where to concentrate efforts.
- What is history of pest control for the pest at this site? What is being done currently? This will indicate how large the problem is and how hard it may be to solve.

Summary of COCKROACH Management Techniques Compatible with an IPM Program

Education

Educate principals, teachers, and students about the effects their actions have on pest management and about the relationship between roaches and food/garbage. Encourage all staff to store food in roach-proof containers (see below).

Monitoring

- Use sticky traps
- Use a hairdryer or compressed air to flush out roaches instead of aerosol spray

Physical/Mechanical Controls

- Exclusion
 - Building repairs
 - Caulk or paint closed cracks and crevices
 - Fill gaps around pipes, cables, and wires that pass through walls both inside and outside the structure.
 - Weather-strip doors and windows
 - Screen doors and windows
- Vacuum up roaches (use vacuum w/HEPA filter) to remove pest quickly and to prevent exposure to airborne allergens

Sanitation/Habitat Modification

- Store garbage in garbage cans or dumpsters outside the building.
- Remove garbage containing food wastes from building before nightfall. Use plastic liners in trash containers.
- Keep interior and exterior garbage cans clean.
- Store food in roach-proof containers (screw top jars are not roach-proof unless lid has a rubber gasket).
- Encourage policies that keep food out of the classroom.
- Limit areas where food can be eaten.
- Thoroughly clean cans and bottles before storing for recycling.
- Thoroughly clean food preparation and eating areas daily. Do not leave dirty overnight.
- Regularly steam clean large appliances in kitchens.

Chemical Controls (Use according to directions on product label.)

Note that new products are constantly coming on the market. Brand names listed are for example only. No endorsement of specific products is intended nor is criticism implied of similar products that are not mentioned.

PRODUCT	ACTIVE INGRED.	NOTES
Sticky Traps Use for monitoring. May get destroyed during cleaning.		
Lo-Line	N.A.	Low profile to fit in tight places.
Roach Baits		
Avert gel	Abamectin	Gels are most attractive the first 3 days after application

PRODUCT	ACTIVE INGRED.	NOTES
Roach Baits (cont.)		
Maxforce gel	Hydramethylnon	Gels are most attractive the first 3 days after application
Siege gel	Hydramethylnon	Gels are most attractive the first 3 days after application
Maxforce FC gel	Fipronil	Some roach resistance has been noted.
Pre-Empt gel	Imidicloprid	
Magnetic Roach Food paste	Boric Acid	
Roach X paste	Boric Acid	non-drying formula, stays attractive for 4-5 months
Niban granular	Boric Acid	
Roach Bait Stations Bait stations may be harmed by steam cleaning. Occupants may think bait stations are unsightly. Roaches can use empty bait stations as harborage.		
Avert	Abamectin	
Maxforce (also a granular formulation)	Hydramethylnon	Use granules outside for Oriental roach.
Maxforce FC	Fipronil	
Dusts Use in wall voids and cracks and crevices. Not good in wet sites.		
Borid	Boric acid	Brownbanded roach will avoid. Must be applied in a fine layer; no clumps or piles.
TimBor	Borate	Must be applied in a fine layer; no clumps or piles.
Diatomaceous Earth (many brands)	Diatomaceous earth	Repellent
Insect Growth Regulators (IGR) Withstand up to 800°F. Do not affect adults. Make roaches hungry enough that they will eat bait that is otherwise unpalatable. IGR vapors are heavier than air, so place higher rather than low. Hydroprene sterilizes young roaches.		
Gentrol Point Source	Hydroprene	Lasts 3 months. Use with baits for faster control.
Gentrol concentrate	Hydroprene	Lasts 4 months. Use with baits for faster control
Archer	Pyriproxifen	Lasts 7 months. Use with baits for faster control.
Nylar	Pyriproxifen	Lasts 12 months. Use with baits for faster control.

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Roof Rat (*Rattus rattus*) and Norway Rat (*Rattus norvegicus*)

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Important Biological Facts

Habitat

- **Roof rats** are excellent climbers and are usually found in the upper parts of structures. Inside, they prefer to nest in elevated areas such as attics and ceiling voids, but they can also nest on lower floors. Outside, they usually nest above ground in trees, in dense overgrown vegetation, or in piles of wood or debris.
- **Norway rats** do not climb as readily as roof rats and are usually found on the lower floors of structures. Inside, they nest in wall voids and crawl spaces, in storage rooms under seldom-moved materials, or in any cluttered area that is little used. Outside, they nest in the ground in burrows or in unused sewers or storm drains.
- **Mice and Norway rats** can infest the same structure with mice in the upper parts of the structure and rats below.

Food Preferences

- **Roof rats** prefer fresh plant material such as fruits, vegetables, nuts, seeds, and tree bark. They are frequently associated with avocado and citrus trees. Garden snails and dog and cat kibble are also favorite foods.
- **Norway rats** prefer foods high in carbohydrates or protein but will eat almost anything including non-food items such as soap.

Habits and Physical Abilities

- Usually search for food between dusk and dawn.
- Prefer to travel along edges, e.g., the edge of the floor next to the wall, along pipes or rafters, along the outside or inside of a foundation and for roof rats, along overhead utility lines.
- Are wary of crossing open spaces that provide no cover. Hedges and other dense vegetation in landscaping or against buildings provide cover for rodent trails.
- Tend to be extremely wary (though temporarily) of new objects in their environment. (Mice readily investigate new objects and changes in their environment.)
- Can fit through openings the size of a nickel. (Mice can pass through openings the diameter of a pencil.)
- Can climb inside vertical pipes measuring 1 1/2" to 4" in diameter and climb the outside of vertical pipes measuring up to 3" in diameter, or the outside of vertical pipes of any size if they are within 3" of a wall.
- Can jump vertically (from a standstill) at least 24" above a flat surface and horizontally at least 4'. Can reach about 13" above a flat surface.
- Will gnaw and leave marks on almost anything, including wood, chip board, lead pipes, cinder blocks, aluminum, sheet metal, sun-dried adobe, and the exposed edge of a piece of glass.
- Excellent swimmers, especially Norway rats. Can swim up through the water seal, or trap, of a toilet.

SIGNS OF RODENT PRESENCE

Live or Dead Rodents

- Because they are mainly active at night, seeing live rats in the daytime usually means that either there is a heavy infestation, that their harborage has been disturbed (perhaps by construction), or that new rats are moving into the area and haven't found any harborage yet. It can also mean that a small or medium infestation of rats has developed a daytime feeding pattern in response to periodically available food, e.g. kibble being placed out for pets at a certain time every day.
- Because mice can be active during the day, seeing them during the day does not necessarily indicate any special conditions.

- A freshly dead rodent indicates an infestation, but an old, dried body may merely indicate a previous infestation.
- Always use safety equipment, including rubber gloves, goggles, a HEPA filter respirator, and a disposable coverall, when removing rodent bodies. Moisten the body with a disinfectant, such as 2 tablespoons of bleach in 2 quarts of water. The moisture will prevent particles from moving through the air and the bleach will destroy any harmful microbes.

Droppings

- Always use the safety equipment described above when inspecting or removing rodent droppings. Moisten droppings with a disinfectant (see above) to prevent particles from becoming airborne and to destroy any harmful microbes in the droppings. If you encounter piles of droppings, be sure to moisten each layer with the disinfectant.
- The greatest number of droppings will be in feeding areas and near harborage.
- Rat droppings are 1/2" to 3/4" long and 1/4" in diameter. Mouse droppings are much smaller, about 1/4" long. Bat droppings closely resemble mouse droppings; however, bat droppings crumble easily and a closer look with a magnifying glass will usually reveal insect parts in the droppings.
- Droppings all of a uniform size can indicate an infestation of a single rat; many different sizes can indicate a breeding population.
- Fresh droppings are moist and soft, and they glisten or look wet. After a few days to a week, the droppings dry, become hard, and appear dull rather than shiny. After a few weeks, rat droppings become gray, dusty, and crumbly. Mouse droppings become hard, dry, and dull or whitish.
- If old droppings are moistened they may look like new ones, but they will still be crumbly instead of soft.
- In order to monitor for current rodent activity, remove the droppings so that fresh droppings are apparent during further inspections.

Damage to Goods and Structures

- Rats gnaw to get at food in packaging or containers, to obtain nesting material, and to keep their incisors from growing too long.
- When they gnaw, rats leave 2 parallel marks about 1/8" across (for mice, about 1/16" across).

Grease Marks or Rub Marks

- These marks on beams, rafters, walls, pipes, and other fixtures are the result of oil and dirt rubbing off rats' fur along frequently traveled routes.

Runs or Burrows

- These may be found outside along foundations, walls, or fences or under bushes or debris.

Tracks

- Footprints and long, thin marks of a tail being dragged or rested can easily be seen on dusty surfaces or in mud.

Noises and Smells

- Sounds of gnawing, clawing, fighting, and scrambling are particularly audible at night when rats are most active.
- Rats impart a distinctive odor to an area over time.

Summary of RAT Management Techniques

Compatible with an IPM Program

For rat control to be effective, it must combine eliminating rodents from the structure with excluding them from the structure. Only if this is done systematically, thoroughly, and completely will you achieve success.

Education

Educate principals, teachers, and students about the effects their actions have on pest management and about the relationship between rats and food, garbage, and clutter. If rats invade a building, food must be stored in rat-proof containers (see below).

Inspection

- Make a site plan to record your findings.
- Inspection must be detailed and thorough both inside and out.
- Look for signs of rodent presence (see previous pages).
- Note all possible harborage sites, sources of food and water, and holes that provide access to building.
- Use a non-toxic tracking powder such as chalk dust, talcum powder, diatomaceous earth, etc. on smooth surfaces to gain more information about rodent movements.
- Note bird and bat problems because rats may not be far behind. Rats will feed on bird eggs, chicks, and young bats.
- Inspect vegetation for runways, nesting sites, and possible access to building or roof. Look for fruit- or nut-bearing trees.
- Look for pipes and utility wires that provide access to the building or roof.
- Inspect garbage facilities.
- Inspect all planters, wood piles, portable storage containers, and outbuildings.
- Look for piles of trash, clutter, and other debris both inside and out.

Physical/Mechanical Controls

• Exclusion

- Make general building repairs.
- Seal large and small (down to 3/16") holes in structure both inside and out. Seal small holes with steel or copper wool (copper will not rust) and caulk.
- Seal vents with 1/4" hardware cloth.
- Seal gaps where pipes and wiring enter the structure.
- Weather-strip doors and windows, use metal kickplates or raised metal doorsills to prevent rodent entry.
- Make sure air conditioning units are well-sealed, especially those on the roof.
- Repair broken sewer pipes.
- Install threaded caps on drains.

• Trapping

- Use snap traps or glue boards and record their locations on your site plan.
- Traps do not need to be cleaned and may be more attractive when dirty.
- Always use safety equipment including rubber gloves, goggles, a HEPA filter respirator, and a disposable coverall when servicing traps.
- Monitor traps regularly and frequently, and keep bait fresh. Rats avoid old or rancid bait.
- Set snap traps with the trigger end facing the wall and the edge of the trap flush with the wall. Two or three traps in a row to prevent rats from jumping over them without being caught.

- Snap traps can also be set parallel to the wall, back to back with their triggers facing away from each other. Set glue boards with the long side touching the wall.
- Nail traps to walls or rafters; wire them to pipes with the trigger projecting into the runway.
- Move objects around to funnel rats into traps.
- Use as baits, foods rats are already eating, or try the baits listed below.
- Baits for Norway rats include pieces of hot dog, bacon, liver, peanut butter, or nut meats.
- Baits for roof rats include nuts, dried fruit, fresh apples or bananas, candy, marshmallows, raisins, or peanut butter.
- Baits that don't stick to the trigger can be tied on with string or dental floss or glued on with white glue.
- It may be necessary to “pre-bait” traps for rats: place traps out with bait, but do not set triggers. Check daily to see if bait is taken. When it is, add new bait and set triggers. At this point, try simply smearing some of the bait on the underside of the trigger. Rats will manipulate the trigger looking for the bait that they were accustomed to finding and that they can now smell.
- Use plenty of traps.
- Experiment to find what works best in each situation.

Sanitation/Habitat Modification

- Store garbage in garbage cans or dumpsters outside the building. Make sure they are without holes, have tight-fitting lids, and are cleaned frequently.
- Remove garbage containing food wastes from building before nightfall.
- Store food in rat-proof containers (glass or metal). This includes pet kibble and grass seed.
- Never leave pet food out before or after pets eat.
- Promptly clean up spilled bird seed around feeders.
- Regularly pick up fallen fruit and nuts outside.
- Trim bushes, grass, and weeds at least 18” from all buildings. Thin out dense bushes.
- Trim trees at least 3’ to 6’ away from buildings. Keep vines off of buildings.
- Break up dense plantings with pathways, stretches of lawn, or very low groundcover to discourage long rodent runs.

Ultrasonic Devices

There is no evidence to show that these devices kill rodents or prevent them from entering buildings.

Biological Controls

- Cats can “prune” a rodent population but will seldom eliminate it, and they cannot be counted on as a deterrent.
- Owls and snakes are predators, so when considering the use of chemical control techniques, remember that, depending on the toxicant used, these predators can be killed by consuming poisoned rats.

Chemical Controls

In general, chemical controls should be used only as a last resort or in emergency situations. Rodenticides can pose hazards to non-target animals, including children and dogs. Poisoned rodents may die in inaccessible places and cause odor and fly problems. Overuse of many rodenticides has led to widespread resistance; however, research has shown that resistance in rats may be overcome if enough time (at least 30 days) is allowed to elapse between exposures. This seems to indicate that it may not be necessary to resort to the newer rodenticides such as brodifacoum and others that can last for months in a dead rodent body and make it a continuing hazard.

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Spiders

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Important Biological Facts

General Information

- Spiders are “arachnids” rather than insects. Spiders have 8 legs (insects have only 6) and only 2 body regions—the cephalothorax (head and thorax) and abdomen. Insects have 3 body regions—head, thorax, and abdomen.
- All spiders are predators and feed mostly on live prey, although they can also feed on dead animals, insect eggs, and even pollen. and nectar.
- Spiders provide great benefit to humans by reducing insect populations.
- Not all spiders build webs to catch their prey. Some go out hunting for their food while others lie in wait.
- Spiders are shy animals and seldom bite people. When they do, it is usually the result of the spider being trapped or squashed. Many of the reported spider bites are most likely caused by mosquitoes, bed bugs, assassin bugs, ants, ticks, dermatitis or other conditions.

The Black Widow (*Latrodectus mactans*)

The main spider of concern in this area is the black widow. Brown recluse spiders do not live in California, although it is possible for them to be transported here from other parts of the country on furniture or other goods.

Distinguishing Characteristics

- The females are usually shiny black with a red hourglass marking on the underside of their abdomens.
- The markings of young black widows are variable and can include orange, white, yellow and red bands and spots. As they grow, the spiderlings acquire more black markings.
- Mature male black widows are half the size of the female and have markings similar to those of the spiderlings. The mouthparts of the male are not strong enough to bite humans.
- The female makes an untidy and coarse web in dark, protected areas that are usually only a few feet above the ground.

Black Widow Feeding Behavior

- Female black widows seldom leave their webs. They wait for prey to come to them. Many times the male will remain in the web with the female after mating and feed on food she has caught.

Potential Danger from Black Widows

- Female black widows are shy and retiring and must be seriously provoked before they bite.
- Black widow bites are rarely fatal (less than 1% of the time).
- Young children, the elderly, and people with cardiovascular problems are most at risk for serious complications.

Where Black Widows are Found

- In general, these spiders prefer areas close to the ground that are dark, dry, protected, and situated in the paths of the insects they are feeding on. The following are some examples:
- Lower shelves and door jambs in cupboards, closets, and storage sheds
- Small cracks and crevices in the foundations of houses, garages, sheds, and other outbuildings
- The undersides of outdoor furniture
- In and around materials and boxes stored in garages and sheds.
- In and around materials stored outside, especially those that have stood unused for long periods of time. Examples include flower pots, lumber piles, firewood, stones, rubble, and machinery.
- Along railroad tracks

Summary of SPIDER Management Techniques Compatible with an IPM Program

Monitoring

- For black widows, monitor at night with a flashlight both indoors and out. Look in their preferred habitat (see above). At night females move to the center of their web and are easier to see.
- For other web-building spiders, look for the presence of webs.
- Look for insect infestations inside the building—spiders may be nearby.

Physical/Mechanical Controls

- Exclusion
 - Make building repairs.
 - Caulk cracks and crevices.
 - Fill gaps around pipes, cables, and wires both inside and outside the structure.
 - Weather-strip doors and windows.
 - Install insect screens on doors, windows, and attic and foundation vents.
- Vacuum up spiders, webs, and egg cases—this is the primary control technique for black widows and other web-building spiders, especially useful during inspections.
- Remove webs with long-handled cleaning devices.
- Exterior lighting
 - Replace mercury vapor lights with sodium vapor lights (less attractive to insects that spiders eat).
 - Use yellow light bulbs in outside fixtures around homes (also less attractive to insects).
- Ventilation
 - Insure proper ventilation in attics and crawl spaces to reduce excess moisture and therefore the insects that spiders feed on.

Sanitation/Habitat Modification

- Reduce hiding places for spiders.
 - Remove piles of debris, lumber, flower pots, stones, rubble, etc.
 - Move firewood as far as possible away from the building. Store off the ground and cover with plastic to keep dry.
 - Cut vegetation at least 18” away from building, especially vines and heavy ground covers such as ivy.
 - Keep grass short near buildings.
- Improve storage practices.
 - Keep storage areas tidy and orderly. Eliminate clutter, especially books, papers, lumber, etc. that are stacked on the floor.
 - Store items in sealed boxes if possible, off the floor and away from walls.
- Vacuum areas frequently, especially if black widows are a problem.
- Control insect populations that spiders may be feeding on, such as ants, roaches, flies, and fleas.

Devices

Note that new products are constantly coming on the market. Brand names listed are for example only. No endorsement of specific products is intended nor is criticism implied of similar products that are not mentioned.

DEVICE	NOTES
Vacuum	Use a vacuum with a HEPA filter. The Lil' Hummer from Miracle Marketing Corp. uses a HEPA filter, can be carried as a backpack, and comes with various accessories for pest control.
Webster	Oversized bottle brush attached to an extension pole for removing webs.

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Garbage Management Guidelines

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Sanitation is of prime importance in preventing the occurrence of a number of pests such as ants, cockroaches, flies, pigeons, mice, rats, raccoons, and yellowjackets. Sanitation also plays a major role in controlling these pests. Denying pests access to food decreases the attractiveness of the area and curtails pest proliferation.

Policy and Education

- **Policy should encourage clean campuses.** Set policies that encourage students and staff to keep campuses clean and to take pride in a clean school.
- **Educate school personnel about sanitation.** Educate students and staff about the relationship of food and garbage to pest presence.

Food wastes from kitchens, cafeterias, food concessions, etc.

- **Drain food wastes.** Remove as much liquid as possible and store in a container with a tight-fitting lid or in a sealed plastic bag until discarding.
- **Set food containers in detergent and water moats.** During ant invasions, containers of food or food waste that must remain open can be placed in larger, shallow pans filled with water and a small amount of detergent. The detergent breaks the surface tension of the water that would otherwise allow the ants to float across to the container.
- **Store food waste properly.** Store food wastes and packaging that is contaminated with food residue in sealed plastic bags until discarding. Examples of packaging include food wrappers and yogurt and milk cartons. The smell of souring milk is particularly attractive to houseflies and can bring them from a great distance. Remove food wastes to an outside garbage can or dumpster at the end of each day.
- **Fix broken drains promptly.** Drains or electric garbage disposal units that leak, or drains that allow food waste to accumulate under sinks or floors should be fixed promptly. The area must then be thoroughly cleaned to remove any residue from under the floor, inside the walls, or in cracks and crevices. If food residues remain, they will attract and feed cockroaches, rats, and flies.
- **Thoroughly clean counters, floors, and sinks daily.** Never leave food out overnight. Any food that cannot be stored in the refrigerator must be stored in rodent-proof containers.

Other garbage

- **Clean recyclables before storing.** Rinse all cans, bottles, and plastic containers before recycling or discarding.
- **Use ant- and roach-proof recycling bins,** and as much as possible, locate recycling bins in cool areas and make sure they are emptied at least weekly. Some grocery stores have found that the majority of their cockroach population was being sustained by the residues in recyclables.
- **Remove food wastes promptly.** Any other garbage that may contain food waste should be removed daily from the building. Pay particular attention to offices, locker rooms, and break rooms, i.e. wherever people may consume food.
- **Remove corrugated cardboard.** Cardboard boxes should be broken down and stored in a cool place away from food preparation areas. These boxes make good cockroach habitat and can sometimes transport roaches from a supplier to the school. If they are stored at the school for more than a week at a time, they can become a major harborage for roaches already on the premises.

Indoor garbage cans

- **Line garbage cans.** Line receptacles with plastic if there is a chance that they will be used for food waste.
- **Keep garbage cans clean.** Clean receptacles at least once a week if they are used for food waste.
- **Remove garbage promptly.** Never allow garbage containing food waste to remain in a building overnight to feed cockroaches and rodents.

Outdoor garbage cans

- **Use garbage cans with lids.** Outdoor garbage cans should be equipped with domed tops with vertical, spring-loaded swinging doors. The swinging door will help prevent yellowjackets and flies from gaining access to food wastes. Doors must be kept clean to avoid attracting yellowjackets and flies.
- **Put garbage *into* cans.** Educate students about putting garbage *into* the garbage cans.
- **Line garbage cans.** Line outdoor cans with plastic and clean cans at least once a week to prevent buildup of food residues.
- **Empty cans frequently.** Empty the cans daily or as often as necessary to prevent garbage from impeding the closure of the lid. Never allow garbage to remain in these cans overnight to attract rodents and raccoons.
- **Promptly remove any garbage thrown outside the can.**

Dumpsters and other exterior storage receptacles

- **Locate dumpster downwind of doors.** Place any dumpsters, garbage cans, and recycling containers downwind from the outside doors of buildings, particularly doors to kitchens or cafeterias, to avoid attracting flies into the building. Flies are attracted first to the waste odors and then fly upwind along odor trails emanating from the doorways leading to cooking areas.
- **Keep lids on dumpster and garbage cans.** Dumpsters and garbage cans should have lids that fit snugly when closed and should always remain closed when not in use. Never leave lids open at night; rodents and raccoons will have easy access to food.
- **Secure lids to cans.** If dogs or raccoons are tipping over garbage cans, use spring-type or stretchy fasteners hooked over the lids.
- **Clean waste receptacles at least weekly.** Dumpsters should have drains so they can easily be hosed out with a high pressure stream of water. If necessary, receptacles can be scoured with a brush and soapy water. A solution of borax in water will effectively eliminate odors that may attract flies.
- **Regularly inspect wet soil around dumpsters.** Flies can develop in soil where water from cleaning dumpsters and garbage cans is emptied. If maggots are found, scoop them up along with the soil and place them in a plastic bag sealed with a knot or a twist-tie before disposal.
- **Inspect garbage cans before nightfall.** At the end of each day, inspect all outdoor storage receptacles and collect any garbage that is lying around outside the dumpsters or garbage cans. Make sure their lids are closed.
- **Don't store garbage outside the dumpster.** Never store extra garbage in paper or plastic outside of dumpsters or garbage cans.
- **Remove garbage weekly.** Garbage should be collected and moved off-site at least weekly.

Remove pet feces daily.

- **Use a plastic bag.** Pet waste can be scooped up in a plastic bag and sealed with a knot or twist-tie before disposal.
- **Pet waste breeds flies.** Droppings that remain moist because of humidity, lawn sprinklers, or rain can breed a number of flies.
- **Rats feed on droppings.** Droppings that dry quickly may attract adult flies with their odors but are unlikely to host many maggots; however, dry or wet, they serve as food for rats.

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Pest Proofing/Repairs Needed Inside

Date _____

Inspector _____

School _____

Building # / Location _____

For each repair, specify location and action needed. Draw a floor plan on the reverse side of this form to clarify locations. State priority for each work item.

- ? Seal holes in wall around pipes, cables, and wires
- ? Seal cracks and crevice with caulk or paint
- ? Seal other holes 1/4" or larger
- ? Fix leaky plumbing
- ? Doors ? Repair ? Replace ? Weather-strip ? Add kickplate
- ? Other _____
- ? Correct excessive moisture problems
- ? Remove clutter
- ? Bring order to storage rooms/closets
- ? Store rodent nesting material (fabric, paper, rug scraps, plastic, insulation) in rodent-proof containers
- ? Clean drains
- ? Screen drains
- ? Cap drains in basement floors
- ? Store human and pet food in pest-proof containers
- ? Improve sanitation
- ? Dispose of insect- or rodent-infested goods
- ? Remove fecal matter (rodents, bats, birds)
- ? Sanitize animal droppings
- ? Investigate secondary pest potential from rodent infestation (e.g. fleas, mites)

Pest Proofing/Repairs Needed Outside

Date_____

Inspector_____

School_____

Building # / Location_____

For each repair, specify location and action needed. Draw a building plan on the reverse side of this form to clarify locations. State priority for each work item.

- ? Cut vegetation back from building walls at least 18"
- ? Remove ivy or other vines from sides of buildings or nearby trees
- ? Trim back tree branches that touch or rub against building
- ? Seal /repair air conditioning units
- ? Seal holes in wall around pipes, cables, and wires
- ? Seal other holes 1/4" or larger
- ? Doors ? Repair ? Replace ? Weatherstrip ? Screen
 ? Other_____
- ? Windows ? Repair ? Replace ? Weatherstrip ? Screen
 ? Other_____
- ? Repair roof
- ? Move compost into rodent proof container
- ? Fix leaking irrigation
- ? Eliminate standing water
- ? Improve drainage
- ? Screen drains
- ? Bring order to storage sheds
- ? Store rodent nesting material (fabric, paper, rug scraps, plastic, insulation) in rodent-proof containers
- ? Store grass seed and pet food in rodent-proof containers
- ? Remove debris, lumber, or rock piles
- ? Move firewood piles as far away as possible from structure
- ? Cut grass or weeds
- ? Remove fallen fruit or nuts
- ? Remove fecal matter (pets, rodents, bats, birds)
- ? Sanitize animal droppings

? Investigate secondary pest potential from rodent infestation (e.g. fleas, mites)

Pest Inspection/Sanitation Report

Date _____ School _____

Building # / Location _____

Inspector _____ InspectionType Initial Quality Control Routine

Evidence of Infestation(s)

Pest	Location	Pest	Location
Ants		Fleas	
Cockroaches		Stored Prod. Pests	
Mice		Pigeons	
Rats		Other	

Sanitation Survey

FOOD PREPARATION	YES	NO	RECEIVING	YES	NO
Equipment clean			Floors clean		
Appliance drip pans clean			Area neat and tidy; no clutter		
Floors clean			Empty boxes stored in cold storage		
Floor drains clean			Empty boxes stored away from kitchen		
Sink drains clean			PUBLIC AND STAFF AREAS		
Counters/Tables clean			Restrooms clean		
Food stored pest-proof containers			Plumbing in good repair; no leaks		
Perishables stored in refrigerator			Locker room clean		
Garbage removed daily at end of day			Locker room free of food and food waste		
Spillage cleaned regularly			Employee lounge clean		
Floors and counters dry; no standing water			Food stored properly in lounge		
Plumbing in good repair; no leaks			Food stored properly in classrooms		
Windows/doors screened			Trash removed daily before end of day		
Gaps around/under doors or windows repaired			Janitorial closet clean		
Pest proofing needed			Pest Proofing needed		
STORAGE AREAS			EXTERIOR		
Floors clean			Dumpster/garbage cans cleaned weekly		
Floor drains clean			Dumpster/garbage cans have lids		
Food stored in pest-proof containers			Lids closed on dumpster/garbage cans		
Recyclables cleaned before storing			Garbage area downwind from kitchen		
Spillage cleaned regularly			Dumpster/Garbage area clean		
Items stored 6" to 8" off floor			Garbage removed at least weekly		
Items stored 12" to 18" away from wall			Pet waste removed daily		
Stock rotated			Loading dock clean		
Area neat and tidy; no clutter			Gaps under/around doors repaired		
Pest proofing needed			Area is trash- and weed-free		
OTHER			Area is dry; no standing water		
			Pest proofing needed		
			OTHER		

Comments/Recommendations _____

Pesticide Use, Disposal, and Storage Guidelines

In California, pesticide use, disposal, and storage are governed by laws in the California Food and Agriculture Code (FAC) and regulations in Title 3 of the California Code of Regulations (CCR). The laws and regulations concerning pesticide use have become increasingly complicated over the past few years. Outlined below are important regulations that affect pesticide use in California schools. The applicable sections from the FAC and the CCR have been cited. For more detailed information, see the Pesticide Safety Information Series N available from the Marin County Department of Agriculture at (415) 499-6700.

- **Follow general safety standards.** When performing pest control using a pesticide, use only equipment in good repair that is safe to operate. Be careful, plan your treatment activities, and use suitable methods to apply the chemicals. Avoid contamination of the environment.
(CCR 6600)
- **Make sure the pesticide you are using is registered for use in California.** It is unlawful for any person to possess or use any pesticide that is not registered.
(FAC 12995)
- **Read the pesticide label.** Pesticide labels contain information to protect your health. A copy of the registered label that specifies the manner in which the pesticide is to be used shall be available at the use site.
 - Every label displays a “signal word” that gives an indication of the relative acute health hazard. The signal words are as follows:
 - DANGER — highest potential hazard to people and the environment.
 - WARNING — moderate potential hazard to people and the environment.
 - CAUTION — Lower potential hazard to people and the environment.
 - The pesticide label also specifies safety precautions to follow. Eye protection is required for most activities involving mixing/loading, application, and equipment maintenance. Regular eye glasses and sunglasses DO NOT provide adequate protection. Chemical-resistant gloves are always required and must be made of rubber or other chemical-resistant material. The label may require using a respirator, chemical-resistant hat, apron, and boots. Employees shall wear a coverall when they handle any pesticide with the signal word “Danger” or “Warning.” Read the label carefully to determine what specific protective clothing is required.
(CCR 6602, 6736, 6738)
- **All applicators must be adequately trained before handling pesticides.** Employees who use pesticides must be trained for each pesticide handled. The training must include the following:
 - The meaning of precautionary statements on the pesticide label.
 - Routes pesticides can enter the body and the signs and symptoms of pesticide over-exposure.
 - Emergency first aid and how to obtain emergency medical care.
 - Safety requirements and procedures.
 - Environmental concerns such as drift, runoff, and wildlife hazards.
 - Applicable regulations and the Material Safety Data Sheet (MSDS)
 - The location of the completed *Hazard Communication for Employees Handling Pesticides in Noncrop Settings* (Pesticide Safety Information Series N-8 from the Department of Pesticide Regulation).

The school must keep a written training record that shows applicators have received the necessary training.

To apply restricted materials, the applicator must be licensed or certified to apply the chosen material or be under the direct supervision of someone who is.

(CCR 6724, AB 2260)

- **Inspect equipment before each day of use.** Make sure that equipment used for mixing, loading, transferring, or applying pesticides is inspected before each day of use, properly calibrated, and determined safe to use.
(CCR 6742)
- **Evaluate the site for likelihood of harm or damage.** Prior to and while applying a pesticide, an applicator must evaluate the site to be treated, surrounding properties, and weather conditions to determine that likelihood of harm or damage. No pesticide application shall be made when there is a reasonable possibility of contaminating persons or non-target sites or animals.
(CCR 6614)
- **Be prepared for all emergencies.** Compile a list of phone numbers to call for help and a list of first aid procedures to be administered before help arrives. Keep this list in service vehicles and/or an accessible area near a phone.
(CCR 6726)
- **Plan for emergency medical care in advance.** Employees must know the name, address, and phone number of the facility at which emergency medical care is available. This information must be posted in a prominent place at the worksite or in a work vehicle. If there are reasonable grounds to suspect that someone has a pesticide related illness, they must be taken to a physician immediately.
(CCR 6726)
- **Keep records of pesticide use.** The minimum requirements for recorded information are the date and place of application, amount used, product name, active ingredient(s), manufacturer's name, and the U.S. Environmental Protection Agency's product registration number. This information is needed to comply with the Healthy Schools Act and must be kept for four years in a place accessible to the public.
(CCR 6624 and AB 2260)
- **Dispose of pesticides properly.** DO NOT dispose of pesticides down the drain, in the toilet, the gutter, or storm drains! Even though labels may direct you to wrap partially full pesticide containers in newspaper and throw them into the trash, this is NOT ALLOWED in California. Pesticides must be disposed of at a Class 1 hazardous waste facility. Empty containers must be triple rinsed at the application site at the time of use. Place rinsate into the spray tank. Properly rinsed, empty containers can be disposed of in a Class 2 sanitary landfill. Call your local Storm Water Pollution Prevention Program or your County Department of Agriculture for more information.
(CCR 6670)
- **Store pesticides properly.** Pesticides with the signal words "Danger" or "Warning" must be stored in locked area that is dry, separate from food and feed, and away from children and pets. Signs visible from any direction of possible approach and readable at 25 ft. must be posted on the storage area. The sign should read "Danger: Poison Storage Area. All unauthorized persons keep out."
(CCR 6674)
- **Storage for pesticides marked "Caution."** Although the law does not specify storage for pesticides with the signal word "Caution," it is prudent to keep these pesticides under lock and key in a dry location separate from food and feed and away from children and pets.

Appendix F

- **Training Outline: Landscape IPM in Marin County Schools**
- **Summary of Evaluations: Landscape IPM Training**

Training Outline: Landscape IPM in Marin County Schools

Date and Place: This is a 4-part series on 7/20, 7/27, 8/3 & 8/10 at San Marin High School, 15 San Marin Dr., Novato, CA

Time: 10am to Noon

Speaker: Michael Baefsky of Baefsky and Associates, Orinda, CA

Note: IPM product displays from a number of vendors will be on view.

Workshop I—Integrated Pest Management in the Landscape

9:30 to 10:00 Registration confirmation and sign in

10:00 to 11:15 Introductory Session

1. What is the Healthy Schools Act of 2000 and how does it affect you
 - a. Designating an IPM Coordinator
 - b. Annual pesticide product notification of staff and parents
 - c. Maintaining a registry of staff and parents
 - d. Posting warning signs when pesticides are applied
 - e. Exemptions from posting
 - f. Record keeping requirements

2. IPM—What it is and what it isn't
 - a. IPM is a problem-solving process.
 - b. Monitoring (or information gathering) is used to determine if and when the pest problem should be treated.
 - c. Record keeping allows you to fine tune your pest management process and allows you to transfer accurate information from one employee to another.
 - d. Knowing the biology and habits of a pest will give you an edge in controlling that pest. Biological information helps you formulate a multifaceted approach to control.
 - e. IPM involves detective work to solve problems.
 - h. IPM is not a monthly chemical treatment program, not even one that rotates through a number of chemicals.
 - f. IPM is not substituting less-toxic chemicals for more toxic chemicals. IPM allows an IPM Coordinator to choose from a broad range of techniques, devices, and chemicals to solve a problem.
 - g. IPM strives to change the circumstances that lead to pest problems, Business and maintenance practices and sometimes even architecture may require modification in order to provide more permanent solutions to pest problems.

3. IPM for Yellowjackets
 - a. Pest biology—life cycle, food preferences, habitat preferences, important facts needed for controlling them.
 - b. Monitoring for the pest (both tools and tactics)
 - c. Keeping records of monitoring and treatments and why it is important to do so.
 - d. Sanitation/prevention
 - e. Non-chemical and physical controls (including tools and devices)
 - f. How to set up a yellowjacket baiting program

11:15 to 12:00 Outdoor Practicum

1. Participants will be divided into teams of 2 and assigned a previously placed yellowjacket trap
2. Participants must find trap by locating it on a pre-made monitoring map and locating it at the physical site
3. Participants will kill insects in trap by placing trap in a soapy water solution.
4. Participants will then pin and identify the insects at an outdoor station and package them for delivery to county agricultural department.
5. Participants will fill out a monitoring form.
6. Questions and answers

Noon Dismissal

Workshop II—Managing Vertebrate Pests in the Landscape

9:30 to 10:00 Registration confirmation and sign in

10:00 to 10:20 Gopher biology and ecology

1. Pest biology—life cycle, food preferences, habitat preferences, important facts needed for controlling them.
2. Pest ecology

10:20 to 10:40 Gopher management tools

1. Keeping records of monitoring and treatments and why it is important to do so.
2. Trapping
3. Baiting
4. Habitat modification
5. Sanitation
6. Chemical control

10:40 to 11:00 Identification: Gophers vs. ground squirrels, voles, moles, rats, house mice

11:00 to 12:00 Outdoor Practicum

1. Participants will be divided into teams of 2 and assigned an area of gopher habitat to map
2. Participants will discuss how to evaluate the population
3. Participants will practice setting traps, one of each type available
4. The group will analyze the gopher population in each area: creek, baseball field, football field, area between backstop and playground.

Noon Dismissal

Workshop III—IPM for Weeds in Non-Turf Areas

9:30 to 10:00 Registration confirmation and sign in

10:00 to 11:00 Introductory Session

1. Identification of weeds collected before class by instructor
2. How to quantify weed populations
3. How to assess the status of a weed—major, minor, or aesthetic problem.
4. Management options such as mowing, hand weeding, habitat modification, mulch, chemical control.
5. how to choose an option.

11:00 to 12:00 Outdoor Practicum

1. Participants will be divided into teams of 2 and will spend 15 minutes surveying an assigned area.
2. Second quarter hour will be spent classifying the weeds in the assigned area.
3. The last half hour will be spent evaluating different areas and discussing with the group how to decide on a treatment method.

Noon Dismissal

Workshop IV—IPM for Weeds in Turf Areas

9:30 to 10:00 Registration confirmation and sign in

10:00 to 11:00 Introductory Session

1. Turf types found on school grounds
2. Discussion of the particular horticultural need of athletic fields
3. Key weeds found in athletic fields.
4. Management options for athletic fields:
 - a. Cultural: mowing, aerification, irrigation, fertilization, overseeding, rest & rotation
 - b. Design: drainage and edging
 - c. Physical: green flaming, hand picking
 - d. Chemical options

11:00 to 12:00 Outdoor Practicum

1. Participants will conduct a soil drainage test
2. Participants will perform an assessment of the soil texture
3. Participants will assess the weed population in an assigned area.

Noon Dismissal

Summary of Evaluations: Landscape IPM Training
Michael Baefsky, July 20 through August 10, 2001

QUESTIONS (Participant comments or additions are in quotes)	RESPONSES (15 attended, 14 Eval. returned)	NO ANSWER
1. What 2 things that you learned in class can you actually use or implement in your day to day work?		2
“The variety of controls for gophers”	8	
“Botanical information/weed identification”	2	
“Weed management”	2	
“Bee & wasp prevention”	1	
“Monitoring yellowjackets before baiting”	1	
“Identifying mole & gopher habitat”	1	
“Broadleaf weed control for gophers”	1	
“Turf management basics”	1	
“Household pest management”	1	
“Pesticide elimination”	1	
“All”	1	
2. What 2 things would you like to implement but know you can’t?		6
“Poison for gophers”	2	
“Owl boxes”	2	
“Broadleaf weed control for gophers”	1	
“Monitoring for weeds, yellowjackets, gophers”	1	
“Monitoring for yellowjackets before baiting”	1	
“Weed eradication in turf areas through replanting”	1	
“Weed monitoring”	1	
“Weed control”	1	
“Spraying for weeds”	1	
“Weed removal & control without poisons”	1	
3. What are the major obstacles to implementing concepts/practices you have learned in this class? (Check the 2 most important)		1
Lack of time	12	
Lack of staff	6	
No authority to make changes	3	
Lack of interest	2	

QUESTIONS (Participant comments or additions are in quotes)	RESPONSES (15 attended, 14 Eval. returned)	NO ANSWER
Other: "Public"	1	
4. Would you like to continue the discussions we have begun here in order to share knowledge among districts in the County?		
Yes	13	
No	1	
5. Would you interested in coming to a periodic meeting of school grounds keepers and supervisors to discuss problems & successes and to have a guest speaker on a particular topic of interest/concern to you?		
Yes	13	
No	1	
6. If yes, how often would you be willing to come?		
Monthly ("for continuing ed hours")	4	
Quarterly	6	
Every 6 months	4	

Comments:

Please continue your efforts!!! Thank you.

We need help and authorization from the district to implement these new ideas.

Excellent program.

Great information. Excellent, practical instruction. Enthusiastic instructor. Should be more of these sessions throughout the year.

Community relations needs to be a big part of pest control.

Passionate instructor.

Appendix G

Training Materials for Landscape IPM in Marin County Schools Workshop

Training Materials for Landscape IPM in Marin County Schools Workshop

Appendix H

- **Training Outline: Parent Information Night**
- **Parent Information Night School IPM Resource List**
- **Parent Information Night Model School IPM Project Summary**
- **School Newsletter Article Advertising the Parent Information Night**
- **Parent Information Night Flyer**
- **Parent Information Night Poster**

Training Outline: Parent Information Night

Reducing the Risks from Pesticides in Marin County Schools

Date and Place: This talk was given twice.

July 17, 2001, 7:30 pm, Corte Madera Recreation Center, 498 Tamalpais Dr. in Corte Madera, CA

Oct. 18, 2001, 7:30 pm at Redwood High School, 395 Doherty Dr., Larkspur, CA

Speaker: Phil Boise, Community Environmental Council, Santa Barbara, CA

7:30 to 7:45 Introductory Session

1. Introduce speaker, give background
2. What is the Healthy Schools Act of 2000?
 - a. Designating an IPM Coordinator
 - b. Annual pesticide product notification of staff and parents
 - c. Maintaining a registry of staff and parents
 - d. Posting warning signs when pesticides are applied
 - e. Exemptions from posting
 - f. Record keeping requirements

7:45 to 8:15 Introduction to IPM

1. What is IPM?
 - a. Reducing risk from pest and management procedures
 - b. Problem-solving tool
 - c. Using common sense—requires basic information
 - d. Knowledge-based, information intensive
 - e. Outsmarting the pest
2. Goals of IPM
 - a. Reduce risk
 - b. Solve problems
 - c. Prevent pest
 - d. Increase efficiency
 - e. Save time
 - f. Save money
 - g. Reduce liability
 - h. Improve aesthetics
 - i. Fun job
 - j. Happy customers
3. How does IPM work?
 - a. Thresholds—is management worth the effort?
economic aspects/safety issues/aesthetics/nuisance factors
 - b. Monitoring
 - c. Integration of control measures—cultural, mechanical, biological, chemical

8:15 to 8:30 IPM Example: Clover in a field

1. Identify pest.
 - a. Burr clover (*Medicago hispida*)?
 - b. White clover (*Trifolium spp.*)?
2. Identify problem.
 - a. Cosmetic?
 - b. Safety?
 - c. Taking over field?
 - d. Complaint by decision maker/occupant?

3. Identify tolerance threshold.
4. What is biological weak link of pest?
5. What does plant tell us?
 - a. Pioneer species, legume
=low nitrogen, low calcium
=depleted, compacted soils
 - b. Medics—high pH
 - c. Clover—low pH
6. Possible to modify habitat?
 - a. Antagonism—Make soil conditions less desirable to clover.
 - b. Competition—Raise mowing height to shade/make turf more competitive
 - c. Exclusion—Overseed
7. Results
 - a. Address the core of the problem
 - b. Long term solution
 - c. No need for pesticides

8:30 to 8:45 Implementing IPM

1. Map out strategy—How do we get there from here?
 - a. Clearly outline priorities
 - b. Goals are to minimize risk while maintaining the value of assets and function of the site
 - c. Collect baseline data
 - d. Devise implementation plan/timeline
 - e. Training
 - f. Record keeping/oversight
 - g. IPM Coordinator or consultant
2. Maximize existing resources
 - a. Buy-in is critical
 - b. Experience and knowledge of staff is very valuable
 - c. Bring employees into the loop
 - d. Create a task force that includes all trades
 - e. Communication and coordination is the #1 barrier
3. Training
 - a. Recognize concerns are universal
 - b. Staff is not alone
 - c. Staff is smart and important
 - d. Staff is empowered to make changes
 - e. IPM is a problem solving process, not material substitution
 - f. “In diversity lies stability”
4. Budget
 - a. Varies with: speed of implementation, existing resources, current condition of assets, willingness to experiment, motives
 - b. Invest in information: training, communication, library

8:45 to 9:00 pm Implementing IPM

Questions and answers

Parent Information Night School IPM Resource List

LOCAL RESOURCES

Marin Department of Agriculture

Stacy Carlsen, Agricultural Commissioner
1682 Novato Blvd., Suite 150-A
Novato, CA 94947-7021
Phone: 415-499-6700
email: scarsen@co.marin.ca.us
<http://www.co.marin.ca.us/depts/AG/main/pestenforce.cfm>

Provide information on

- Integrated pest management and alternatives to pesticides
- Safety, handling and proper use of pesticides
- Legal issues involving pesticides
- Pesticide use in various schools
- insect and plant identification and biology

Bio-Integral Resource Center (BIRC)

Tanya Drlik, IPM Consultant
P.O. Box 7414
Berkeley, CA 94707
Phone: 510-524-8404
Fax: 510-524-1758
email: birc@igc.org

BIRC is non-profit, member-supported center for education and research focused on practical, non-toxic and least-toxic methods of pest management. They provide information over the phone on all aspects of pest management, especially alternatives to pesticides.

BIRC publishes

- Common Sense Pest Control Quarterly* (aimed at the lay person)
- The IPM Practitioner* (aimed at professional pest managers and researchers)
- Directory of Least-Toxic Pest Control Products* (updated yearly)
- a wide variety of booklets and manuals on least-toxic pest management for various pests

University of California Cooperative Extension

1682 Novato Blvd., Suite 150-B
Novato, Ca 94947
415-499-4204

Marin Master Gardeners can provide information on IPM and make insect identifications.

Pesticide Education Group (PEG)

email: PEGOFMARIN@aol.com

Marin Beyond Pesticides

email: calpac@pacbel.net

<http://www.pesticidefreezone.org/history.htm>

SCHOOL IPM-RELATED WEB SITES

US EPA Region 9

Integrated Pest Management for Schools: A How-to Manual (a BIRC manual)

<http://www.epa.gov/region09/toxic/pest/school/index.html>

Community Environmental Council

Reducing Pesticides in Schools: How Two Elementary Schools Control common Pests Using Integrated Pest Management Strategies

<http://www.communityenvironmentalcouncil.org/>

University of Florida School IPM Web Site

<http://www.ifas.ufl.edu>

Provide information about school IPM and maintain a list-serve for discussion about school IPM.

Purdue University: IPM Technical Resource Center Web Site

<http://www.entm.purdue.edu>

In the development stage. Priority area of development at present is resources for school administrators, but also has information for parents.

University of Wisconsin Extension School IPM Manual

<http://ipcm.wisc.edu/programs/school/default.htm>

TECHNICAL, PEST MANAGEMENT, TOXICOLOGY AND ADVOCACY SITES

Biological Control Virtual Information Center

<http://www.ncsu.edu/biocontrol/biocontrol.html>

Community Environmental Council

<http://www.communityenvironmentalcouncil.org/>

Green Gardener Certification Program

<http://greengardener.org>

Non-chemical IPM Resource List

<http://www.panna.org/resources/advisor.html>

Central Contra Costa Least Toxic Home and Garden Pest Management Resource List

<http://www.centalsan.org/education/ipm/aphids.html>

Presidential Memorandum: Environmental Impact Reduction Checklist for Landscaping

<http://es.epa.gov/oeca/ofa/pollprev/land.html#N>

UC Statewide IPM Project

<http://www.ipm.ucdavis.edu/GENERAL/links.html>

Soil Food Web: composting, microbiology and more

<http://www.soilfoodweb.com/>

National Park Service IPM Manual

<http://www.nature.nps.gov/wv/ipm/manual.htm>

Environmental Defense Chemical Profile Search

<http://www.scorecard.org/chemical-profiles/>

EXTOXNET: Extension Toxicology Network

<http://ace.orst.edu/info/extoxnet/pips/ghindex.html>

Pesticide Action Network Pesticide Database

<http://pesticideinfo.org/>

Californians for Pesticide Reform (CPR)

<http://www.igc.org/cpr/>

National Coalition Against the Misuse of Pesticides (NCAMP)

701 E Street, SE, Suite 200

Washington, D.C. 20003

Phone: 202-543-5450

<http://www.beyondpesticides.org/>

This non-profit organization serves as a clearinghouse for information pesticide safety and alternatives pest management strategies. They offer a number of pesticide-related publications and materials. They also provide information on their web site about school IPM across the country.

Parent Information Night Model School IPM Project Summary

In the summer of 2000, the Marin County Department of Agriculture began work on the “Model Integrated Pest Management Plan for Schools” funded by a grant from the California Department of Pesticide Regulation. The goal of this 1 1/2 year project is to provide tools and information to schools that will help them implement a sustainable integrated pest management (IPM) program. The proposal for this grant was a collaboration among the Department of Agriculture, the Marin County Office of Education, the Maintenance and Operations Department at the Novato Unified School District, and the community.

The first phase of the project involved an assessment of current pest management practices at three Marin County schools: Bacich Elementary in the Kentfield School District, Miller Creek Middle School in the Dixie School District, and San Marin High in the Novato Unified School District. Our assessments were completed in December of 2000, and we found that these schools have been striving to reduce pesticide use already.

From these school assessments we will devise an “assessment tool” that can be used in other schools in the county and in the state.

The second phase of the project is developing an IPM training program for school personnel in Marin County. The most intensive training is designed for maintenance and grounds employees, but we will also hold informational meetings for superintendents, school board members, teachers, and parents. Training began this summer and continues through the fall.

On July 18, 2001 the first “School IPM Exposition” for school personnel, pest control operators, and others was held at San Marin High in Novato. This Expo will showcased techniques, devices, and products that can be used in school IPM programs. Over 275 people attended from all over the state and 26 exhibitors participated.

We have begun an outreach program to bring attention to the Healthy Schools Act, to the work we have done in Marin, and to the materials we have available for other schools to use.

In the future we plan to look for funds to continue to provide assistance to Marin County Schools in their transition to IPM.

For more information contact Tanya Drlik, Project Coordinator at 510-524-8404.

What is Integrated Pest Management?

Integrated Pest Management, or IPM as it is often called, is an approach to pest control that focuses on long-term prevention and suppression of pest problems. IPM uses information about the pest’s habits and life cycle, combined with regular monitoring, to determine if, when, and how to intervene for optimum pest control.

If treatment is necessary, IPM uses a number of different strategies, often at the same time, to control a pest. Strategies are chosen from mechanical and physical methods such as traps and barriers; horticultural practices such as proper plant care; and sometimes, biological controls (bugs eating bugs). Chemical controls are used only as a last resort. They are used as spot treatments and are chosen and timed to have the smallest negative impact on people, other non-target organisms, and the environment.

School Newsletter Article Advertising the Parent Information Night

Parent/Teacher Information Night:

Reducing Risks from Pesticides in Our Schools

Do you have questions or concerns about pesticide use in our schools? Would you like to know what is being done and what more can be done to solve school pest problems in the least hazardous way?

The Marin County Department of Agriculture is sponsoring a parent/teacher information night on October 18 at 7:30 PM in the Kreps Conference Room at Redwood High School, 395 Doherty Drive in Larkspur. This will be a chance to learn how you can support the creation of healthier, safer school environments, and an opportunity to have your questions about controlling pests in schools answered. Our guest speaker will be Phil Boise, Integrated Pest Management (IPM) Program Manager for the Community Environmental Council in Santa Barbara. Phil is a delightful speaker and will explain the Healthy Schools Act, the process of integrated pest management, and the challenges that face school maintenance staff, parents, and teachers. Learn how, together, we can reduce the risks to our children from pesticide use in schools. You are cordially invited to attend. Refreshments will be served.

For more information, contact Tanya Drlik, Marin Model School Integrated Pest Management Project Coordinator at 510-524-8404.

Parent Information Night Flyer

Parent Information Night Poster

Appendix I

- **Presentation Outline for Teacher IPM Training: Classroom Cleanliness**

Presentation Outline for Teacher IPM Training: Classroom Cleanliness

(20 minutes)

- I. Introduce speaker**
- II. Description of Marin County Model School IPM Project**
- III. Healthy Schools Act of 2000**
 - A. How many have heard of the HSA?
 - B. Key elements
 - Annual notification
 - Registry - notify 72 hours before
 - Posting - 24 hours before - 72 hours after
 - Certain things exempt
 - Maintain records for 4 years. Make available to the public
 - DPR promote voluntary adoption of IPM
- IV. IPM**
 - A. How many have heard of IPM?
 - Emphasizes prevention - Make School Inhospitable
 - Pesticides used as a last resort
 - IPM is a way of thinking about pests (rats, mice, ants, wasps, termites) problems
 - Use in school
 - Use at home
 - Use in parks
 - B. Need to ask: why is the pest here?
 - How many have had a pest (other than a kid) in the classroom?
 - Why do you think it was there?
 - What do we need as humans to survive?
 - What does a pest need? Food, water, shelter, access
 - C. Food for pests
 - Ask teachers in room where/how they keep food and what they think of as food for pests.
 - Art and Science projects
 - Food for snacks/rewards
 - Manipulatives
 - Decorations
 - Lunches, Sodas
 - Spills
 - Pet food
 - Paste, Paint
 - D. Food control
 - Cleanup spills
 - Place food in containers
 - No food in trash in classrooms OR remove promptly & clean up afterward
 - One designated place for food (a place for human food and a place for pet food)
 - Keep pet cages clean
 - E. Water
 - Keep things dry
 - Report leaky pipes and faucets
 - F. Shelter
 - Remove clutter

- Make things orderly
- G. Access
- Report holes
- Do not prop open screens

V. Communication

- A. Communication between teachers and pest management personnel is very important
- B. Accurate and timely information to the proper person is most useful
- C. Name of proper person and how to reach him/her _____

VI. Personal use of pesticides

Teachers are not authorized to bring in their own pesticides

Appendix J

- **Teacher Training Outline for Aquatic Outreach Institute Presentation**

Teacher Training Outline for Aquatic Outreach Institute Presentation

Set up:

On four different tables, display products for controlling aphids, ants, cockroaches, and snails and slugs. These products should include reduced risk materials (signal word Caution), devices, other products, as well as pesticides with the signal words Warning and Danger.

Learning to Read the Label

Ask the class to examine each table of products, and tell them to be sure to read the label.

Ask class what they noticed about the labels of these products

- Signal Words
- Active Ingredient
- Inert Ingredients
- Directions
- Disposal instructions
- Safety precautions

I. APHIDS

BIOLOGY-short description of life cycle and facts pertinent to management
PRODUCTS

- Bio Controls—parasites & predators
- Cultural Controls, e.g., cut down on N fertilizer, use slow release fertilizers
- Physical Controls, e.g. row covers, water washing
- Chemical Controls, e.g., insecticidal soap and oil

II. ARGENTINE ANTS

BIOLOGY-short description of life cycle and facts pertinent to management
PREVENTION, e.g. sanitation, caulking
PRODUCTS

- Cultural Controls, e.g., remove aphid-attracting plants from near the building
- Physical Controls, e.g. sticky barriers
- Chemical Controls, e.g. desiccating dust, baits

III. COCKROACHES

BIOLOGY-short description of life cycle and facts pertinent to management
PREVENTION, e.g., sanitation, removing clutter, caulking
PRODUCTS

- Monitoring w/ sticky traps
- Physical Controls, e.g. caulk
- Chemical Controls, desiccating dust, baits

IV. SNAILS AND SLUGS

BIOLOGY-short description of life cycle and facts pertinent to management
PREVENTION, e.g., water early in the day, remove attractive plants
PRODUCTS

- Physical Controls, e.g. barriers, hand picking
- Chemical Controls, e.g. iron phosphate

WHAT IS IPM?

Decision-making process

Decide if you need to treat

Don't assume you need to treat

If decide to treat, then when?

After treating, evaluate success

- requires thinking
- looks at whole ecosystem—the garden, house, building
- uses monitoring (careful checking) to see if treatments are actually needed.
- impossible to avoid all damage—impossible to eradicate encourages tolerating more.
- If treatments are needed,
 - IPM advocates using wide variety of controls
 - Nature is complex—1 control won't work
 - prevention—sanitation, educating people about how they contribute to problem
 - biological —bugs eating bugs
 - physical—traps, hand picking
 - horticultural—as in how you tend the plant
 - chemical— is the last one—chemical controls are used as a last resort
- Integrated into a comprehensive treatment program.
- If pesticides used
 - “spot treatments”
 - least-toxic pesticides
 - least-toxic formulations e.g. bait rather than spray

Keep away from human & out of environment

Exposure is the key

If we use chemicals, we must apply them properly & dispose of them properly.

As you may know

Children more vulnerable

- Immune system not mature
- Eat more in relation to body wt.
- More likely to come into contact with pesticides
- Play habits and personal hygiene

HEALTHY SCHOOLS ACT

In September of 2000, Governor Gray Davis signed into law the Healthy Schools Act.

The 2001-2002 school year is the first year we will see this law implemented.

Requires the Department of Pesticide Regulation (DPR) to promote the voluntary adoption of Integrated Pest Management in California schools.

Training for IPM Coordinators

Law requires school districts to

- 1. Designate a staff member** (typically the Director of Maintenance and Operations) to be responsible for carrying out the requirements of the law
- 2. Notify parents and staff annually** about pesticide products the school district expects to use on school grounds.
- 3. Provide the opportunity for staff and parents to register** to be notified 72 hours prior to all pesticide applications.
- 4. Post warning signs** at each area of the school where pesticides will be applied. Signs must be posted 24 hours in advance and remain 72 hours after application.

5. **Maintain records** of all pesticide use at the school site for 4 years. Records must be available to the public.

Working in Marin

Assessment tool

Training programs

Outreach

Expo

Next Year

Expand to other counties in Bay Area to do training

What school districts are they from and any of them open to IPM??

Starting an IPM Program in their school

Do your homework

Don't use scare tactics and exaggerated claims

Get an expert in pest management on your side

Don't start out confrontational

Too many bulldogs out there

Solutions will come from workers

Appendix K

- **Certificate of Completion for Groundskeepers in Landscape IPM Training Course**
- **Letter of Recognition to Ron Warfield, Novato Unified School District**

Certificate of Completion for Grounds Keepers in Landscape IPM Training Course

Letter of Recognition to Ron Warfield, Novato Unified School District

Appendix L

- **General Outreach Articles**
- **Outreach Articles for Parents and Teachers**

General Outreach Articles

These articles were sent to the following:

- ***Bay Area Parent*** (Bay Area monthly parent newspaper)
- ***Parents' Press*** (Bay Area monthly parent newspaper)
- ***The Communicator*** (Statewide newsletter for California PTAs)
- ***The PTA in California*** (PTA journal)
- ***California Educator*** (Monthly journal of the California Teachers' Association)

ARTICLE #1

New Law Requires Notification of Pesticide Use in Schools

In September of 2000, Governor Gray Davis signed into law the Healthy Schools Act. The 2001-2002 school year is the first year we will see this law implemented. The law requires schools to notify parents, guardians, and school employees about pesticides used in their schools and requires the Department of Pesticide Regulation (DPR) to promote the voluntary adoption of Integrated Pest Management (see box) in California schools.

Parents and teachers should be aware that the new law requires school districts to

1. **Designate a staff member** (typically the Director of Maintenance and Operations) to be responsible for carrying out the requirements of the law
2. **Notify parents and staff annually** about pesticide products the school district expects to use on school grounds.
3. **Provide the opportunity for staff and parents to register** to be notified 72 hours prior to all pesticide applications.
4. **Post warning signs** at each area of the school where pesticides will be applied. Signs must be posted 24 hours in advance and remain 72 hours after application.
5. **Maintain records** of all pesticide use at the school site for 4 years. Records must be available to the public.

The notification and posting requirements listed above do not apply to certain pesticide products such as self-contained baits or traps, sanitizers, and disinfectants.

What is Integrated Pest Management?

Integrated Pest Management, or IPM as it is often called, is an approach to pest control that focuses on long-term prevention and suppression of pest problems. IPM uses information about the pest's habits and life cycle, combined with regular monitoring, to determine if, when, and how to intervene for optimum pest control.

If treatment is necessary, IPM uses a number of different strategies, often at the same time, to control a pest. Strategies are chosen from mechanical and physical methods such as traps and barriers; horticultural practices such as proper plant care; and sometimes, biological controls (bugs eating bugs). Least toxic chemical controls are used only as a last resort. They are used as spot treatments and are chosen and timed to have the smallest negative impact on people, other non-target organisms, and the environment.

ARTICLE #2

Marin County Leads the Way in Implementing the Healthy Schools Act with the Model School IPM Project

Marin County schools have been selected to participate in a project designed to help implement IPM programs to control pests such as ants, rats, mice, and weeds on their campuses. Stacy Carlsen, Marin County Agricultural Commissioner, working together with Marin schools, the community, and environmental organizations, obtained funding for this project with a grant from the California Department of Pesticide Regulation.

The project, coordinated through the Marin Department of Agriculture, involves providing technical assistance, IPM training, and recommendations to Marin County schools. Educational materials, reports, and recommendations developed during this project will be made available to all school districts in California to aid in their adoption of IPM practices.

For more information about the Marin Model School IPM Project, contact Tanya Drlik, Project Coordinator, at 510-524-8404.

To read more about the Healthy Schools Act, visit DPR's website: <http://www.cdpr.ca.gov>

Outreach Articles for Parents and Teachers

These articles were published in Marin school or PTA newsletters and reached between 4000 and 5000 families. The articles were sent to school principals accompanied by a letter from Mary Jane Burke, Marin County Superintendent of Schools (a copy of her letter follows these articles).

ARTICLE #1

The Marin County Department of Agriculture, in cooperation with our school district, is working to reduce pesticide use on school grounds. This is the first in a series of articles about creating a healthier, safer school environment.

Invasion of the Snack Snatchers

It's fall, kids are back in school and so is the Argentine ant, our main nuisance ant in Marin County. Have you noticed any of these guest workers in classrooms recently? They come inside for a number of reasons. In the fall they are usually searching for food and water because outside, their primary food source is declining as winter approaches.

The favorite food of the Argentine ant is the "honeydew" excreted by aphids and a number of similar insects. When honeydew is scarce, ants search far and wide for any kind of food they can get their jaws on. And so you see the ant trails going to the half-empty soda can and gnawed chicken bones at the bottom of the garbage can, or the cupcake crumbs on a desk. Understanding why creatures invade our spaces can help us learn how better to prevent them. Preventing pest problems reduces the need for pesticides.

But what do you do when ants are swarming across the floor? First, remove the attractive items and clean up any food residues on classroom surfaces. You can wipe up the ant trail using a sponge and a spray bottle of soapy water. Just rinse the sponge and wash the ants down the drain. Try to find the ants' entry point and block it with a piece of tape. The hole can later be permanently sealed with caulk.

Classroom cleanliness can go a long way toward eliminating ant invasions. Keep food remains out of the classroom garbage, and store food out of the reach of ants. Using food for art or science projects and storing snacks in the classroom is an open invitation for not only ants, but also cockroaches, mice, and rats to move right in. If food items must be kept in the classroom, store them in sturdy plastic containers with snap-on, tightly fitting lids.

—Tanya Drlik, Marin Model School Integrated Pest Management Project Coordinator, Marin County Department of Agriculture

For more information on least-hazardous methods of handling pest problems, visit the Marin County Department of Agriculture web site at www.co.marin.ca.us and click on "Services," then "School IPM Program," then "Specifically for Parents and Teachers" and go to "IPM Fact Sheets."

Or contact

Bio-Integral Resource Center in Berkeley, 510-524-2567, email: birc@igc.org

or

Marin County Storm Water Pollution Prevention Program (for free fact sheets on various pests, including ants): 415-499-6528.

ARTICLE #2

Parent/Teacher Information Night:

Reducing Risks from Pesticides in Our Schools

Do you have questions or concerns about pesticide use in our schools? Would you like to know what is being done and what more can be done to solve school pest problems in the least hazardous way?

The Marin County Department of Agriculture is sponsoring a parent/teacher information night on October 18 at 7:30 PM in the Kreps Conference Room at Redwood High School, 395 Doherty Drive in Larkspur. This will be a chance to learn how you can support the creation of healthier, safer school environments, and an opportunity to have your questions about controlling pests in schools answered. Our guest speaker will be Phil Boise, Integrated Pest Management (IPM) Program Manager for the Community Environmental Council in Santa Barbara. Phil is a delightful speaker and will explain the Healthy Schools Act, the process of integrated pest management, and the challenges that face school maintenance staff, parents, and teachers. Learn how, together, we can reduce the risks to our children from pesticide use in schools. You are cordially invited to attend. Refreshments will be served.

For more information, contact Tanya Drlik, Marin Model School Integrated Pest Management Project Coordinator at 510-524-8404.

ARTICLE #3

New Law Requires Notification of Pesticide Use in Schools

In September of 2000, Governor Gray Davis signed into law the Healthy Schools Act. The 2001-2002 school year is the first year we will see this law implemented. The law requires schools to notify parents, guardians, and school employees about pesticides used in their schools and requires the Department of Pesticide Regulation (DPR) to promote the voluntary adoption of Integrated Pest Management (see below) in California schools.

Parents and teachers should be aware that the new law requires school districts to

1. **Designate a staff member** (typically the Director of Maintenance and Operations) to be responsible for carrying out the requirements of the law
2. **Notify parents and staff annually** about pesticide products the school district expects to use on school grounds.
3. **Provide the opportunity for staff and parents to register** to be notified 72 hours prior to all pesticide applications.
4. **Post warning signs** at each area of the school where pesticides will be applied. Signs must be posted 24 hours in advance and remain 72 hours after application.
5. **Maintain records** of all pesticide use at the school site for 4 years. Records must be available to the public.

The notification and posting requirements listed above do not apply to certain pesticide products such as self-contained baits or traps, sanitizers, and disinfectants.

For more details on the Healthy Schools Act, see DPR's website: <http://www.cdpr.ca.gov>

What is Integrated Pest Management?

Integrated Pest Management, or IPM as it is often called, is an approach to pest control that focuses on long-term prevention and suppression of pest problems. IPM uses information about the pest's habits and life cycle, combined with regular monitoring, to determine if, when, and how to intervene for optimum pest control.

If treatment is necessary, IPM uses a number of different strategies, often at the same time, to control a pest. Strategies are chosen from mechanical and physical methods such as traps and barriers; horticultural practices such as proper plant care; and sometimes, biological controls (bugs eating bugs). Chemical controls are used only as a last resort. They are used as spot treatments and are chosen and timed to have the smallest negative impact on people, other non-target organisms, and the environment.

—Tanya Drlik, Project Coordinator, Marin Model School Integrated Pest Management Project, Marin Department of Agriculture

ARTICLE #4

Marin County Leads the Way in Implementing the Healthy Schools Act with the Model School IPM Project

In 1999, Marin County schools were selected to participate in a project designed to help us implement integrated pest management (or “IPM”) programs to control pests such as ants, rats, mice, and weeds on our campuses. IPM is an approach to pest control that emphasizes pest prevention, sanitation, and other alternatives to pesticides. Pesticides are used only as a last resort.

Stacy Carlsen, Marin County Agricultural Commissioner, working together with Marin schools, the community, and environmental organizations, obtained funding for this project with a grant from the California Department of Pesticide Regulation. Work on the Model School IPM Project began in the summer of 2000 and continues through December of 2001. The next phase of the project begins in March 2002.

Project Components

- Conducting assessments of pest management practices at schools.
- Facilitating information and idea exchange among school maintenance directors
- Providing IPM training programs for school maintenance and grounds personnel
- Developing and distributing educational materials and resources.
- Conducting outreach and education on pest management issues and the Healthy Schools Act.
- Providing technical assistance to school districts. This is available to any Marin County public school or to parents who wish to help their school implement an IPM program. Call the Marin County Department of Agriculture, 415-499-6700.

Educational materials, reports, and recommendations developed during this project will be made available to all school districts in California to aid in their adoption of IPM practices. Once again, Marin County leads the way in innovation.

For more information about the Marin Model School IPM Project, call Tanya Drlik, Project Coordinator at 510-524-8404.

Appendix M

- **Letters of Commendation**

1. *Letter to Stacy Carlsen, Marin County Agricultural Commissioner, from Mary Jane Burke, Marin County Superintendent of Schools*
2. *Letter to Mark Riesenfeld, Chief Administrative Officer County of Marin, from Mary Jane Burke, Marin County Superintendent of Schools*

Letters of Commendation

*Letter to Stacy Carlsen, Marin County Agricultural Commissioner,
from Mary Jane Burke, Marin County Superintendent of Schools*

*Letter to Mark Riesenfeld, Chief Administrative Officer County of Marin,
from Mary Jane Burke, Marin County Superintendent of Schools*

Appendix N

- *Letter Requesting Districts to File their AB2260 Parent Notification Letters with the County Department of Agriculture*
- *Reminder Letter*
- *Thank You Letter*

Letter requesting that Districts file their AB2260 Parent Notification letters with the County Department of Agriculture

August 14, 2001

Dr. Rose Marie Roberson, Superintendent
Sausalito School District
630 Nevada Street
Sausalito, CA 94965

Dear Superintendent Roberson,

As you know, the Healthy Schools Act (AB 2260) requires school districts to send parents and guardians a written notification of all pesticide products expected to be applied at the school facility during the year. I would like to request that you file a copy of your notification letter with my office within 10 days of the mailing.

Because questions and concerns may arise from these letters, we are offering an information night for parents on October 18 at the Redwood Community Education Office in Larkspur. We will discuss the integrated pest management process and what parents can do to support rather than hinder school efforts to reduce pesticide use and adopt integrated pest management.

We encourage you to include the enclosed flyer with your notification letter to inform parents of the workshop. Since October 18 is so far away, you may also want to send the notice home in the backpack mail in early October. We recommend photocopying the flyer onto colored paper.

If you have any questions, please feel free to contact Tanya Drlik, my project coordinator, by phone at 510-524-8404, or by email at birc@igc.org.

Sincerely,

Stacy K. Carlsen
Agricultural Commissioner
Director of Weights and Measures

SKC:td
encl.: Flyer: Attention: Marin Parents
cc: Mary Jane Burke

Reminder Letter

October 2, 2001

Dr. Rose Marie Roberson, Superintendent
Sausalito School District
630 Nevada Street
Sausalito, CA 94965

Dear Superintendent Roberson,

If you have already sent me a copy of your Healthy Schools Act notification letter or are in the process of doing so, thank you very much. If you haven't yet sent your letter, this is just a reminder that each school district in California is required to send staff, parents, and guardians a written notification of all pesticide products expected to be applied at the school facility during the year. If you need help writing this letter, please call me.

Filing a copy of your letter with my office will aid me in preparing reference materials that I can make available to your parents if they have questions or concerns during the school year. I am also happy to provide label, product, or safety information if the need arises.

I am very pleased with the willingness of our county's schools to begin adopting IPM practices and with their aggressive implementation of the Healthy Schools Act. If you need assistance with either of these matters, please don't hesitate to call me. I look forward to working with you and Mr. Lyons in the coming school year.

For your reference, I have enclosed a copy of a sample letter that can be used for specific pesticide application notification to those on your registry if that should become necessary.

Sincerely,

Stacy K. Carlsen
Agricultural Commissioner

SKC:td

encl.: Notice of Pesticide Application

cc: Mary Jane Burke
Lester Lyons

Thank you letter to Districts that filed their Parent Notification Letter

December 28, 2001

Dr. Rose Marie Roberson, Superintendent
Sausalito School District
630 Nevada Street
Sausalito, CA 94965

Dear Superintendent Roberson,

Thank you for sending me a copy of your Healthy Schools Act notification letter. The information will help me prepare reference materials that I can make available to parents if they have questions or concerns during the school year. I am also happy to provide label, product, or safety information if the need arises.

I am very pleased with the willingness of our county's schools to begin adopting IPM practices and with their aggressive implementation of the Healthy Schools Act. If you need assistance with these matters, please don't hesitate to call me. I look forward to working with you throughout the coming school year.

For your reference, I have enclosed a copy of a sample letter that can be used for specific pesticide application notification if you should find this to be necessary at any time during the year.

Sincerely,

Stacy K. Carlsen
Agricultural Commissioner

SKC:td

encl.: Notice of Pesticide Application for Schools using No Pesticides

cc: Lester Lyons

Appendix O

- **Outreach Articles Published in Newspapers**

Outreach Articles Published in Newspapers

Appendix P

- **School IPM Section of the Marin County Department of Agriculture Web Site**

School IPM Section of the Marin County Department of Agriculture Web Site

On School IPM Program page

In the fall of 2000, Governor Davis signed into law the Healthy Schools Act (AB 2260) (*clicking this will take people to the text of the law*). This new law encourages the adoption of integrated pest management (IPM) (*clicking this will take them back to the IPM definition*) as a way of reducing pesticide use and protecting the health of our children and the environment.

With a grant from the Department of Pesticide Regulation, the Department of Agriculture has embarked on a long-term project to help schools design and implement IPM programs. Information developed in Marin County will serve as a model for other schools in the state.

Model School IPM Project Description

Healthy Schools Act: Information and Requirements

Specifically for School Staff

Specifically for Parents and Teachers

General Program News and Information

Links to Additional Information and Resources

Model School IPM Project Description

Marin County Selected to Lead the Way

In 1999, Marin County schools were selected to participate in the Model School IPM Project. This project is designed to implement the Healthy Schools Act and to help schools make the transition to integrated pest management (IPM). Using IPM, schools can control pests such as ants, rats, mice, and weeds with the least hazardous methods.

Stacy Carlsen, Marin County Agricultural Commissioner, working together with Marin schools, the community, and environmental organizations, obtained funding for this project with a grant from the California Department of Pesticide Regulation. Work on the first phase of the Model School IPM Project began in the summer of 2000 and continued through December 2001. The next phase of the project begins in March 2002.

Target Schools

The project has completed detailed assessments of pest management practices at three target schools, Bacich Elementary, Miller Creek Middle School, and San Marin High School. The assessments found that these schools are already working to reduce their pesticide use, but could benefit from additional technical assistance to fully implement alternatives. To help fill this need the project has developed IPM training programs and educational materials for the school maintenance directors in the county.

School IPM Expo

On July 18, 2001 an IPM Exposition was held at San Marin High School to showcase companies that provide IPM products and services and to provide networking opportunities for people involved in school IPM. Opening remarks were given by Paul Heliker, Director, California Department of Pesticide Regulation (DPR), Stacy Carlsen, Marin County Agricultural Commissioner, Cynthia Murray, Marin County Supervisor, and Dr. John C. Bernard, Superintendent, Novato Unified School District. Dr. Nita Davidson, of DPR's School IPM Program, gave the closing talk on the Healthy Schools Act.

Twenty-six exhibitors participated including manufacturers, pest control professionals, consultants, non-profit organizations, and public agencies. Over 275 people from around the state attended representing school districts, County Departments of Agriculture, universities, pest control operators, consultants, non-profits, public agencies, and city and state government.

For the first Expo of its kind, the response and support were remarkable.

Looking Ahead

In 2002, the project will continue to provide training for school personnel, not only in Marin County but also in Alameda, Contra Costa, and Solano Counties. Another focus of the project will be providing a forum for Marin school maintenance directors and their staff to exchange information about problems and successes in their pest management programs.

Technical Assistance

Technical assistance in implementing IPM practices is available to any Marin County public school or to parents who wish to help their school adopt an IPM program. Call the Marin County Department of Agriculture, 415 499-6700.

Healthy Schools Act: Information and Requirements

In September 2000, Governor Davis signed into law the Healthy Schools Act of 2000 (Assembly Bill 2260). This law requires schools to notify parents, guardians, and school employees about pesticides used in their schools, and requires the Department of Pesticide Regulation to promote the voluntary adoption of integrated pest management (IPM) in California schools. Most provisions of the law took effect January 1, 2001.

Requirements

The Law: Text of AB 2260, The Healthy Schools Act of 2000

Requirements

Responsibilities of School Districts

1. **Designate a staff member** (typically the Director of Maintenance and Operations) to be responsible for carrying out the requirements of AB 2260 at the schools in their district and training district staff in IPM practices. (If the district decides to use integrated pest management, the designee may also be the IPM Coordinator.)
2. **Furnish annual, written notification to staff and parents and guardians** of all students about pesticide products the school district expects to use on school grounds.
The notice must contain the following:
 - The name of each pesticide product
 - The active ingredient or ingredients in the product
 - The address of the California Department of Pesticide Regulation (DPR) web site, www.cdpr.ca.gov, for more information
3. **Provide the opportunity for staff and parents to register** with the school district if they want to be notified of individual pesticide applications at the school before they occur.
 - Registered persons shall receive notification at least 72 prior to the application.
 - The notice must contain the following:
 - Product name
 - Active ingredient(s)
 - Intended date of application
4. **Post warning signs** at each area of the school where pesticides will be applied.
 - Signs must be posted 24 hours in advance and remain 72 hours after application.
 - Signs must be sufficient, in the district's opinion, to restrict uninformed access to treated areas.
 - Signs must prominently display the phrase "Warning/Pesticide Treated Area" and include the following:
 - Product name
 - Manufacturer's name
 - The USEPA's product registration number
 - Intended date and areas of application
 - Reason for application
 - In case of a pesticide emergency, the warning sign shall be posted immediately upon application and shall remain posted until 72 hours after application.

5. **Exemptions.** The notification and posting requirements above do not apply to the following:
 - Self-contained baits or traps
 - Gel or paste used in crack and crevice treatments
 - Any pesticide exempted from regulation by the USEPA pursuant to FIFRA
 - Antimicrobial pesticides including sanitizers and disinfectants.For more information on exemptions, see the Department of Pesticide Regulation's web site: www.cdpr.ca.gov
6. **Maintain records at the schoolsite** of all pesticide use for 4 years.
 - This can be simply a copy of the posted warning sign with the amount of pesticide written on it.
 - Records will be available to the public upon request.
7. **Emergencies**

“Emergency conditions” are defined in the law as “circumstances in which the school district designee deems that the immediate use of a pesticide is necessary to protect the health and safety of pupils, staff, or other persons, or the schoolsite.”

 - In an emergency, staff, parents, and guardians need not be notified 72 hours in advance.
 - The school district designee or IPM Coordinator must make every effort to provide the notification.
 - Warning signs (see above) should be posted immediately upon application and remain posted for 72 hours.

Responsibilities of the Department of Pesticide Regulation (DPR)

1. **Promote and facilitate the voluntary adoption of integrated pest management** in school districts that voluntarily choose to do so.
2. **Develop criteria for identifying least-hazardous pest control practices** and encourage their adoption.
3. **Develop a model program guidebook** that describes essential program elements for a school district that has adopted IPM.
4. **Maintain a Web site** as a comprehensive directory of resources describing and promoting least-hazardous practices in schools. An electronic copy of the guidebook will be available on the Web site.
5. **Prepare a school pesticide use form** to be submitted to DPR at least annually by anyone engaged in pest control for hire in a school district.

For more information visit DPR's web site: www.cdpr.ca.gov

Or contact Dr. Nita Davidson at DPR, Ph: (916) 324-4100,
email: school_ipm@empm.cdpr.ca.gov

The Law

Text of AB 2260

Specifically for School Staff

Components of a Model School IPM Program

Maintenance Directors' Newsletter

Fact Sheets for Maintenance Directors/IPM Coordinators

Declaring an Emergency Necessitating Pesticide Use

Pesticide Use, Disposal, and Storage Guidelines

Components of a Model School IPM Program

One of the characteristics of an IPM approach that makes it so effective is that the basic decision-making process is the same for any pest problem in any location. The strategies and tactics may change, but the framework in which decisions are made is the same each time. Thus, the pest manager does not need to try to remember dozens of pest control “recipes” for specific pests. Instead, it is an understanding of the components of an IPM program that must be mastered.

An IPM program is built around the following components:

1. **Monitoring** the pest population and other relevant factors such as the condition of structures and the health of plants
 - Monitoring is the regular and ongoing inspection of areas where pest problems do or might occur.
 - Monitoring helps you become familiar with the buildings, grounds, plants, and pests at your school so you can *anticipate* conditions that can trigger pest problems, and thus *prevent* them from occurring or catch them before they become serious.
 - Monitoring helps you decide if treatment is necessary.
 - Monitoring helps you determine where, when, and what kind of treatments are needed.
 - Monitoring and keeping written records allow you to evaluate and fine-tune your treatment program.
2. **Keeping records of your monitoring and treatments activities**
 - Records function as the memory of the IPM program.
 - A monitoring program is only as useful as its record keeping system, and without records you cannot improve and fine-tune your treatments.
3. **Accurately identifying the pest**
 - You must know the name of your pest before you can make intelligent decisions about how to manage it.
 - For help in identifying insects, vertebrates, or weeds, contact the Marin Department of Agriculture at (415) 499-6700.
4. **Determining action levels that trigger treatments**
 - Total eradication of pest organisms is virtually impossible to achieve.
 - Decide what number of pests or what level of pest damage will trigger treatment to prevent unacceptable medical, economic, or aesthetic loss. This number or level will differ from site to site and from pest to pest.
 - Refine your action levels as you gain more experience with the site and the pest.
5. **Assessing alternatives for controlling the pest**

Consider all of the following:

 - *Education*: providing information to change behavior and increase willingness to share the environment with other organisms
 - *Sanitation*: removing sources of food and water for pests
 - *Habitat modification*: repairing or redesigning structures to reduce or eliminate pest harborage, food, and water
 - *Modification of horticultural activities*: altering planting techniques, irrigation, fertilization, pruning, and mowing to improve plant health and to discourage pests; choosing the right plant for the right place
 - *Physical controls*: using traps and barriers, installing screens, weather-stripping, and door sweeps, using vacuums not only for cleaning, but also for vacuuming up pests
 - *Biological controls*: using predators and parasites to control pests—you can conserve or enhance these natural enemies that already live on your school grounds by avoiding pesticide use that will kill them and by growing a variety of flowering plants to provide them with food in the forms of nectar and pollen
 - *Least-hazardous chemical controls*: using pesticides as a last resort in their least-hazardous formulations, as spot treatments only when and where they are needed

- 6. Implementing a variety of management strategies:** IPM's prevention-oriented approach is best achieved by integrating a number of treatment strategies.
- 7. Evaluating your pest management program:** which strategies worked and which didn't?
- 8. Fine-tuning your pest management program:** what should you do differently next time to improve results?
- 9. Establishing effective lines of communication**

All levels of school personnel from administrators through teachers and students to maintenance and grounds staff have a role to play in pest management and must communicate among themselves for the program to work. It is important that everyone understand what is being done about pest problems that affect them and why a particular course of action has been taken.
- 10. Educating and training all school personnel about IPM**

Since all levels of school personnel play a role in pest management, everyone must be educated about IPM and how their actions affect pests and the conditions that encourage them. The amount and kind of training will vary with each level. The most intensive training should be provided for maintenance and grounds personnel.
- 11. Providing recognition for employees**

Recognize staff for outstanding service to protect the school, the public, students, and/or other employees from pests or pesticide use. Reward hard work, new and innovative ideas, and a willingness to try new things.
- 12. Planning for long-term pest prevention and pest control**

This requires both a knowledge of pest biology and building operations. Although the sanitation and pest exclusion measures are technically simple, they may be difficult to plan, fund, and execute. Your long term efforts will often require coordinating various departments that may not normally be involved in pest management.

Maintenance Directors' Newsletter

Coming in spring 2002.

Fact Sheets for Maintenance Directors/IPM Coordinators

Note: For text of the fact sheets listed below, see Appendix E.

The following fact sheets provide information about the biology of the pests and a summary of management techniques that are compatible with an IPM program. The checklists can be used to inspect buildings for pest proofing needs and for sanitation. See links for web sites that can provide additional information.

Fact sheets were researched and written by Tanya Drlik, IPM Specialist and Project Coordinator for the Marin Model School IPM project.

Ants

Cockroaches

Rats

Spiders

Garbage Management Guidelines

Inspection Checklists

Declaring an Emergency Necessitating Pesticide Use

In the Healthy Schools Act, “emergency conditions” are defined as “circumstances in which the school designee deems that the immediate use of a pesticide is necessary to protect the health and safety of pupils, staff, or other persons, or the schoolsite.”

Before an emergency ever occurs, the IPM Coordinator must establish a communication “tree” with the names and phone numbers of people to contact in a crisis. Each contact should have a set of clearly defined responsibilities. For instance, the IPM Coordinator notifies the public information officer who then handles contact with the media and the concerns of parents and the general public. The IPM Coordinator also notifies administrators who decide who to notify at higher levels. The IPM Coordinator must communicate effectively with all those involved in the emergency and must choose information that is appropriate for each person with whom he or she communicates. For instance, the superintendent will not need to be informed of specific mixing instructions for the pesticide, and the pesticide applicator will not need to know the names of the students and staff involved.

The following questions should be used to determine and document emergency conditions and to justify emergency actions:

- **Who** is the person who is alerting you to the emergency? Is the person credible? Does he or she have the necessary knowledge to make a determination of an emergency?
- **What** is the problem? Find out as much as you can about the problem and what is causing it. What kind of pest is involved? Is the problem one of health and/or safety?
- **Where** is the problem? Is the location such that it is an immediate threat to health and safety? Can the area be cordoned off to prevent further problems?
- **When** did the problem occur? Is it happening at this moment, or did it happen two weeks ago, and is just now being reported?
- **How** did the problem occur? What are the circumstances surrounding the incident?
- **Why** did the problem occur? What factors contributed to the creation of the problem?

Once an emergency is declared and the channels of communication are open, the next step is assessing the possible options for solving the problem and choosing the most effective one. Once the treatment has been chosen, the IPM Coordinator should communicate this decision to all necessary parties. When the emergency is over, it is important to assess the effectiveness of the chosen course of action and to make adjustments in the pest management system so that an emergency doesn't recur. This evaluation and the changes that are made should be documented and reported to those involved in the emergency.

Pesticide Use, Disposal, and Storage Guidelines

Note: For text, see Appendix E.

Specifically for Parents and Teachers

IPM Fact Sheets for Parents and Teachers

IPM Articles for School newsletters

Resources and Organizations

IPM Fact Sheets for Parents and Teachers

These fact sheets provide information for solving pest problems in the least hazardous manner and will help you become familiar with the IPM process we are encouraging in schools.

Fact sheets were researched and written by Tanya Drlik, IPM Specialist and Project Coordinator for the Marin Model School IPM project.

Ants

Ants (Spanish) *Coming spring 2002*

Aphids

Cockroaches

Cockroaches (Spanish) *Coming spring 2002*

Fleas

Headlice *Coming spring 2002*

Snails and Slugs

Spiders

Yellowjackets

Less-Toxic Pest Management for ANTS

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The ant most frequently found invading schools and homes in the Bay Area is the Argentine ant, *Linepithema humile*. This ant can also be a pest outdoors when it protects plant-feeding insects—such as aphids, scales and mealybugs—from attack by their natural enemies (ladybugs, lacewings and others). Ants guard these insects in order to harvest the nutritious “honeydew” they excrete.

Although ants can be annoying pests, they provide an ecological cleansing and fertilization service of considerable importance. Ants aerate the soil and recycle dead animal and vegetable material. They kill and eat many pest insects such as termites and immature cockroaches, fleas, and flies. Because of these beneficial aspects, it is undesirable (and probably downright impossible) to eliminate ants from their outside habitat. The best approach to ant management is to try to keep them out of the building.

Detection

Look for individual “scouts” wandering around, or long lines of ants marching to and from the food or water source. Distinguish Argentine ants from carpenter ants by size. Argentine ants are small, around 1/8” long, and dark brown. The queens are slightly larger. Carpenter ants are 1/4” or larger and require different management techniques from those listed below.

Less-Toxic Controls

INSIDE YOUR HOME

- **Kill the scouts.** When you see just one or two ants wandering around, they are actively looking for food (and sometimes water). Kill these scouts when you see them so they can’t call in the hordes when they find a tasty tidbit.
- **Use ant baits.** Baits are better than insecticide sprays because they use a minimum of insecticide and confine it to a very small area. Ants pick up the bait and take it back to feed to their nest mates. For more information, see Tips for Using Ant Baits below.
- **Use insecticidal dusts.** Diatomaceous earth (DE) has little toxicity to humans and pets, but kills ants by absorbing the waxy coating on their bodies, causing dehydration and death. DE is particularly effective when blown into cracks and wall voids before they are sealed. If kept dry, DE will remain effective for years. Use a hand duster to apply DE and wear a dust mask and goggles.

OUTSIDE YOUR HOME

- **Use Sticky Barriers.** Ants cannot cross barriers made from sticky materials. Apply a 4-inch wide band of commercial sticky barrier around the trunk of a tree or bush to prevent ants from protecting aphids and other honeydew-producing insects. Apply the barrier as high on the trunk as possible to prevent people (especially children) from getting stuck. Prune any branches that touch walls, fences, or the ground so ants do not have alternate routes into the plant.
- **Ant Baits.** If you can find the spot where ants are entering the building (this is often difficult to do), place bait stations there; otherwise, use baits only inside.

Prevention

- **Store Food in Ant-Proof Containers.** The Argentine ant will feed on just about anything, so store food in glass jars with rubber seals, or in plastic containers with tight-fitting snap-on lids. Although refrigerator storage is usually safe, ants sometimes do get into refrigerators and freezers. If this happens, a light, temporary coating of petroleum jelly on the rubber seal around the door should keep them out. You may want to replace the seal if it is faulty.
- **Keep Things Clean and Dry.** Keep kitchen surfaces clean and dry, and sweep or vacuum the floor frequently to remove all food scraps. During our long, dry summers ants sometimes invade houses looking for water, so fix leaking faucets and pipes promptly. To keep ants out of your pet’s water bowl, use a soapy barrier (see below).

School IPM Program: Specifically for Parents and Teachers: Fact Sheets:Ants

- **Caulk Cracks.** Follow that ant trail back to the crack where they are entering the building and use silicone caulk to permanently close the hole. Use weather-stripping around doors and windows. It may not be practical to try to seal every hole in your house; but over time, by following ant trails and sealing those holes, you will significantly reduce the number of places ants can get in. If ants are already nesting in wall voids, puff some diatomaceous earth into the void before sealing it (see above).
- **Use Soapy Barriers.** Set pet food dishes or other open containers of food in a shallow pie pan filled with soapy water. This forms a moat that ants cannot cross. It is important to add soap or detergent to the water to break the surface tension so the ants sink and drown. To protect potted plants, put a plastic saucer under the pot and place both saucer and pot into the pie pan. Fill with soapy water to just below the top of the saucer (you don't want the plant to soak up soapy water).

Quick Fix for an Ant Emergency

When ants invade, here are a few quick steps you can take to get the situation under control until you can implement a more permanent solution.

1. Observe the ants and try to determine what they are after (usually left-over food but sometimes a dead bug) and where they are entering the room (usually through a crack in the wall). Mark the entry point so you can find it again. If you can't find an entry point, see #5.
2. If the ants are in one or more lines leading to food, don't remove the food until after Step 3, because they will scatter. Ants are easier to kill if they remain in a line.
3. Clean up the lines of ants. You can do this very easily with a vacuum cleaner. The ants will suffocate in the dust of the vacuum bag. If you don't want to get out the vacuum, use a spray bottle filled with water and about a teaspoon of dish washing detergent. Spray the solution on the ants and wipe them up with a sponge.
4. Once you have cleaned up the ants, block their point of entry by making a temporary closure with a smear of petroleum jelly or a piece of tape. Later, use silicone caulk to permanently close cracks in the wall, along moldings and baseboards, and gaps around pipes and ducts.
5. If you cannot find an entry point, clean up the ants (#3) to a convenient (preferably out-of-the-way) spot to place a bait station (see below, Tips for Using Ant Baits). Remember to remove the bait station when the line of ants has disappeared so you don't attract more ants into the house!
6. If ants have begun nesting in a potted plant, move the plant outdoors and water it thoroughly. Place the pot into a bucket and fill the bucket with water until it comes up to about an inch below the rim of the pot. Using a stick, make a bridge for the ants to get out of the pot and the bucket without getting in the water. The soil in the pot will be too wet for them, and the ants will soon begin carrying their white-colored young to safety. When no more ants emerge, drain the pot and return the plant to the house.

Tips for Using Ant Baits

Ant baits contain a pesticide mixed with an attractive food substance. Ants take small quantities of bait back to their nest to feed to their nest mates. In this way the entire nest can sometimes be eliminated.

- Use baits with either boric acid, hydramethylnon, or arsenic as an active ingredient.
- It can be helpful to have several different baits on hand because Argentine ants change their food preferences frequently depending on environmental conditions and what is going on in the nest. In general liquid baits are attractive all year around, but if one bait is not attracting them, try another. Note: wait at least a day to see if they take the bait.

- Use baits inside. There are several reasons for this: 1) There are too many ants outside to try to eliminate them from around your house (and you wouldn't want to anyway). 2) If you put ant baits around the outside of your house, you run the risk of attracting more ants close to your dwelling and from there it's a short walk to your kitchen or bathroom. 3) Outside it's harder to keep track of the bait stations and easier for kids and animals to get to them. 4) Rain or sprinklers can wash away the bait.

Note: An exception to this is large commercial bait stations filled with liquid boric acid bait and installed and serviced by a pest control company. These large bait stations are tamper resistant and can keep ants from coming into a building.

- Do not spray insecticide around the bait; this will repel the ants.
- Once the line of ants going to the bait has disappeared, remove the bait so you don't attract more ants. If the bait you are using comes enclosed in a bait station, return it to its original box to save to use again. Put the box inside a plastic bag and seal it with a twist-tie. Some arsenic baits will remain attractive for at least 15 years, but some other baits may deteriorate with time.
- Baits don't work right away. In some cases it may take several weeks to kill the ants. At first you may see more ants coming to the bait, but after a few days to a week you should see a significant reduction.

Products

Note that new products are constantly coming to the market. Brand names listed are for example only. No endorsement of specific products is intended nor is criticism implied of similar products that are not mentioned.

Desiccating Dust

Concern® Diatomaceous Earth Crawling Insect Killer, Surefire® Ant Killer

Hand-Duster

Pest Pistol® (If unavailable locally, call 888-784-1722 to order.)

Sticky Barrier

Tanglefoot® and Stickem® Tree Pest Barrier®

Baits containing Boric acid

Terro® Ant Killer II, Drax Ant Kil® Gel and Drax Ant Kil pf

Baits containing Hydramethylnon

Combat® Ant Control System

Baits containing Arsenic

Grants® Kills Ants

Baits containing Fipronil

Combat® Quick Kill Ant Bait

For More Information

If you have questions about the information in this fact sheet, contact the Marin County Department of Agriculture at 415-499-6700, or the Bio-Integral Resource Center, PO Box 7414, Berkeley, CA 94707; (510) 524-2567.

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Less-Toxic Pest Management for APHIDS

©Tanya Drlik 2002

Most plants can tolerate low to moderate numbers of aphids without noticeable damage. On some plants, however, large numbers of aphids can distort foliage and flowers, and stunt plant growth. Some species of aphids can also transmit plant diseases when they puncture plant tissues to feed.

The Honeydew Problem

Aphids excrete “honeydew,” a sweet substance that forms a harmless but sticky coating on leaves. The honeydew is soon colonized by a fungus called “sooty mold,” which is also harmless, but makes leaves look black and dirty. Argentine ants love honeydew, and to insure a continuing supply, they protect aphids from their natural enemies. When this happens, aphid management must include ant management (see also the Ant fact sheet in this series).

Detection

Aphids are small (usually 1/8”), soft-bodied insects. They have pear-shaped bodies with long legs and antennae, and most species have two tube-like structures called cornicles protruding from their hind end. Under certain conditions most species can produce adult forms with wings.

Tolerate Some Aphids

- **Tolerate low to moderate numbers of aphids** so long as they aren’t causing noticeable plant damage. There is a reason for this: aphids have many natural enemies such as spiders, ladybugs, lacewings, and minute parasitoids (“mini-wasps”) that often keep aphid numbers below damaging levels. These beneficial insects rarely appear on the scene until *after* aphids have begun attacking plants. This “lag-time” can be a day or two, or as long as several weeks. As the season progresses, aphid control by these natural enemies improves because more natural enemies are attracted to your garden and more stay to breed.
- **Aphids commonly found on shade trees will not infest your garden annuals**, but these aphids can help attract natural enemies that will attack pests on other plants.

Less-Toxic Controls

- **Learn to recognize beneficial insects.** Among the most important natural enemies of aphids are the mini-wasps (“parasitoids”) that lay their eggs inside the bodies of aphids. These tiny wasps *cannot* sting people. A parasitized aphid (called a “mummy”) looks puffed-up, and its skin hardens and changes color, often to tan, light brown, or black.
- **Attract beneficials to your garden** by planting a wide variety of flowering plants since the adult forms of many beneficial insects, including mini-wasps and lacewings, feed on pollen and nectar.
- **Buy lacewings rather than ladybugs** (see the Products & Resources box below). Lacewings are more likely to stay in your garden than commercially-available ladybugs.
- **Buy beneficials before aphid numbers are high.** If you have an aphid emergency, first use soap or oil sprays (see below) to reduce the population, then release natural enemies. On the other hand, don’t purchase beneficial insects before you have aphids. You will be releasing them into your garden to starve.
- **Wipe off or prune away** colonies of aphids from leaves and buds.
- **Use a forceful stream of plain water** to wash off aphids and honeydew.
- **Use insecticidal soaps** to kill aphids on contact and spare beneficials such as ladybugs. These products do not leave toxic residues.
- **Use spray (horticultural) oils** to control aphids without leaving toxic residues for natural enemies.

Prevention

- **Use slow-release fertilizers.** High levels of nitrogen in the leaves and buds of plants make them particularly attractive to aphids. Fertilizers such as compost, sewage sludge, or encapsulated materials (Osmacote®) are better because they slowly release moderate levels of nutrients.
- **Avoid excessive pruning** because it stimulates aphid-attracting growth.
- **Use a row cover** to exclude aphids and other pests but allow air, light, and irrigation water to reach plants.
- **Control ants** by spraying or painting a 4" wide sticky barrier around woody shrubs or trees.

Aphids—So Many, So Fast

The remarkable life cycle of aphids helps to explain how they can quickly appear in large numbers. In the spring in temperate climates, female aphids called “stem mothers” emerge from “overwintering” eggs. These plump, distinctive-looking aphids do not need to mate to reproduce. Stem mothers give birth to live daughters, and these offspring give birth to more live daughters—all without the need of mating! The swiftly growing female aphid colonies cluster around the stem mother and continue to multiply long after her death. At the end of the season, aphids begin to produce both sons and daughters. When these males and females mature, they mate and the females lay eggs on bud scales or bark to overwinter and begin the cycle again.

Products & Resources

Note that new products are constantly coming on the market. Brand names listed are for example only. No endorsement of specific products is intended nor is criticism implied of similar products that are not mentioned.

Insecticidal Soaps

Safer® Insecticidal Soap Insect Killer

Insecticidal Soap w/Pyrethrin

Safer® Yard and Garden Insect Killer®

Spray (Horticultural) Oils

SunSpray Ultrafine® or Volck®

Encapsulated Fertilizers

Osmocote®

Row Covers

Tufbell®

Sticky Barrier

Tanglefoot® or Stickem® Tree Pest Barrier®

Sources for Lacewings

Buena BioSystems
P.O. Box 4008
Ventura, CA 93007
805-525-2525

Rincon-Vitova Insectaries
PO Box 1555
Ventura, CA 93002
800-248-2847

For More Information

If you have questions about the information in this fact sheet, contact the Marin County Department of Agriculture at 415-499-6700 or the Bio-Integral Resource Center, PO Box 7414, Berkeley, CA 94707; 510-524-2567.

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Less-Toxic Pest Management for COCKROACHES

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Although cockroaches serve a useful function outdoors where they help recycle plant and animal wastes, they are not welcome indoors. Research clearly indicates that roaches can transmit disease-causing organisms from sewers, garbage cans, or bathrooms to kitchen counters and human food. Cockroaches can also trigger allergic reactions in some people.

Detection

Except for size and markings, all cockroaches are similar in overall appearance: flattened, oval-shaped insects with long antennae. Roaches are mainly active at night and generally remain hidden during the day in cracks and crevices near their source of food.

- **Use nontoxic sticky traps to locate roach habitat.** Roaches like to travel by touching the edges of objects. Place traps along the edges of walls, appliances, cupboards, etc., and not in the middle of the room. Sticky traps with a nontoxic “pheromone” attractant will catch more roaches. When you find out where roaches are hiding, you’ll know where to concentrate your efforts.

Less-Toxic Controls

- **Use sticky traps for small infestations.** If you only have a few roaches, you may be able to control the problem with sticky traps.
- **Use a strong vacuum with a crevice attachment** to pull roaches from their hiding places.
- **Use insecticidal dusts such as diatomaceous earth (DE) or boric acid** in wall voids or cracks and crevices before you seal them, and under large appliances or in other prime habitat. To gain access to a wall void, remove the cover plates on electrical outlets and switches.

When properly used, DE has little toxicity to humans and pets, but kills insects by absorbing their outer waxy coating, causing dehydration and death. Use DE sold for pest control and not for pool filters.

Although boric acid has a low acute (immediate) toxicity for humans and pets, it should be handled carefully and kept out of the reach of children and pets. For roaches, boric acid is a slow-acting but effective stomach poison.

When applying these dusts, use a hand duster and wear a dust mask, gloves, and safety goggles. Apply a very light coating because roaches will avoid piles of dust.

- **Use cockroach baits** because they use a minimum of insecticide and confine the poison to a very small area (see “Tips for Using Cockroach Baits”).

Prevention

Prevent cockroach infestations by denying them access to your home and to the food, water, and shelter they need to survive.

- **Store food in containers that seal tightly** or in the refrigerator.
- **Keep things clean and tidy.** Thoroughly clean counters and vacuum or sweep floors daily in eating and food preparation areas. Don’t leave dirty dishes out overnight, even in the dishwasher. Any garbage containing food scraps should be removed from the house nightly. Thoroughly clean recyclables before storing them. At night, place pet food and water bowls in a moat of soapy water. Reduce clutter in all rooms (it provides habitat for roaches).
- **Keep things dry.** Fix leaky plumbing. Keep kitchen surfaces dry whenever they are not in use, especially overnight.
- **Seal cracks and crevices.** Before sealing, vacuum and wash the area to eliminate all roach egg cases, fecal matter, or other debris. Caulk and paint closed cracks around baseboards, cupboards, pipes, sinks, etc. Use mildew-resistant caulk in moist areas.
- **Weather-strip around doors and windows** and repair holes in screens.

School IPM Program: Specifically for Parents and Teachers: Fact Sheets:Cockroaches

- **Inspect materials you bring into your house** for roaches or their egg cases. Pay special attention to used furniture and appliances and cardboard cartons from stores that sell food.
- **Monitor with sticky traps.** Once you have gotten rid of roaches or significantly reduced their numbers, continue to use sticky traps to alert you to a new infestation or a rise in the population. This is especially important in apartment buildings, condominiums, or other connected dwellings where roaches can easily move from one household to another.

Tips for Using Cockroach Baits

- Use baits indoors.
- Reduce other food sources so roaches will feed on baits.
- Use baits with boric acid, fipronil, or hydramethylnon.
- If you are using a gel bait, put small dabs in a number of locations rather than large blobs in a few locations.
- Place baits near areas where roaches are hiding, and between their hiding places and food sources.
- Place baits along the edges of walls, appliances, cupboards, etc., not in the middle of the room.
- Place baits where roaches are most likely to travel or congregate.
- Keep baits out of the reach of children and pets.
- Check bait stations frequently, especially if you have a large infestation. Empty bait stations should be removed because they make perfect roach hiding spots.

Products

Note that new products are constantly coming to the market. Brand names listed are for example only. No endorsement of specific products is intended nor is criticism implied of similar products that are not mentioned.

Desiccating Dust

Concern® Diatomaceous Earth Crawling Insect Killer and Surefire® Crawling Insect Killer

Boric Acid Powder

Roach Prufe®, Victor® Boric Acid Powder

Hand-Duster

Pest Pistol® (If unavailable locally, call 888-784-1722 to order.)

Sticky Traps

Black Flag® Roach Motel

Sticky Traps with pheromone attractant

Victor® Roach Magnet

Baits containing boric acid

Niban® Granular Bait, Niban FG, Seabright® Roach Free System Bait

Bait containing fipronil

Combat® Quick Kill Roach Bait Stations, Combat® Quick Kill Roach Control Gel

Bait containing hydramethylnon

Combat® Roach Roach Control System, Combat® Roach Control Gel

For More Information

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Less-Toxic Pest Management for FLEAS

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The flea most commonly found in and around the home is the cat flea, *Ctenocephalides felis*. Despite its name, the cat flea finds dogs and humans quite tasty too. Flea bites cause irritation, but also serious allergies in some animals and humans.

Detection

Adult fleas spend almost all of their time on an animal's body. Immature fleas (larvae) are small, white, and worm-like. Look for them on the floor, in rugs, in cracks and crevices, and anywhere pets rest or sleep. Larvae feed on dried blood excreted by adults.

In order to know when to begin and end your flea-control efforts, use a specially manufactured flea comb on your pet to keep track of the flea population.

Less-Toxic Controls

Inside Your Home

- **Comb your pet** with a metal flea comb, available at pet stores. Focus around the neck and base of the tail. Keep a wide container of soapy water nearby to drown captured fleas.
- **Bathe dogs** to drown fleas. Use dog shampoo and increase effectiveness by using a flea comb while the pet is lathered. It is not necessary to use shampoo with insecticide.
- **Vacuum carpets, floors, and upholstered furniture frequently** throughout the year. Vacuuming picks up adult and egg-stage fleas, but is less effective at removing larvae. Clean cracks and crevices and seal permanently with caulk. Gently vacuum your animal's coat to remove adult fleas.
- **Use diatomaceous earth (DE)** to treat carpets, upholstered furniture, and pet bedding, or blow it into cracks and crevices. Use a hand duster to apply a fine layer of DE. Wear a dust mask and goggles and avoid getting dust in your pet's eyes. DE has little toxicity to humans and pets, but kills fleas by absorbing the waxy coating on their bodies, causing dehydration and death.
- **Use Borate-based carpet treatments.** Borates have a low toxicity to humans and pets. Fleanix® carpet treatment can control fleas in carpeting for up to a year. Mix powder with the water in a rug shampooing machine, with or without detergent. Borate applied in water poses less hazard to the lungs than borate applied as a dust and it binds to carpet fibers so it cannot be vacuumed up.
- **Flea traps** can be useful if you don't own a pet but still have fleas (but also check for wild animals or rodents nesting in or around your home). Adult fleas are attracted to the warmth and light of a small electric bulb and are caught on sticky paper. Traps will work better in areas where you can exclude animals and humans.
- **Insect growth regulators (IGRs)** prevent flea eggs from hatching and inhibit larvae from developing. The IGRs can be applied to areas such as carpets and pet bedding. IGRs will not kill fleas that have reached adulthood before the material is applied. Use IGRs in combination with other measures listed in this fact sheet. Some products combine IGRs with permethrin to control both pre-adult and adult fleas.

Outside your home

- **Treat outside only where you have found high flea populations.** To find these areas, walk around the yard in a pair of white socks. Check areas where animals rest, sleep, or regularly travel. You will easily see fleas that jump onto the socks.
- **Do not try to combat fleas by spraying around the perimeter of your house or spraying your entire yard.** Spot-treat only those areas where you find large populations of fleas. Fleas will more likely be on an animal or inside your home. Concentrate your efforts there.
- **Check for wild animals** like raccoons and opossums nesting under the house or porch. Dead animals can also be the source of a flea infestation. Treat nests under the house with diatomaceous earth.

- **Use beneficial nematodes** in soil where you have found fleas. Be sure to water the area before and after application. For sources of nematodes see the Products & Resources.

For Your Animal

- **Ultrasonic collars and machines are not effective.** There is no scientific evidence that these products impact fleas and they are not recommended.

The products below should be used on your animal only during flea season. If these products are over-used, fleas will eventually become resistant to them.

- **Fipronil (Frontline®) & imidacloprid (Advantage®)** are applied to the skin of the animal in a small amount at one spot, usually at the base of the neck or between the shoulder blades. The insecticide spreads over the entire body of the pet and is effective for at least a month. These products have a low acute toxicity for mammals but can be irritating to eyes and should not be ingested. Use gloves when applying them.
- **Lufenuron (Program®)** is given orally to the animal. Fleas that ingest this chemical produce only a few viable eggs, and larvae from those eggs cannot mature. Because lufenuron accumulates in fat and crosses the placental barrier, do not treat pregnant, nursing, or very young animals.
- **Insect growth regulators (IGRs)** such as methoprene (Precor) and pyriproxyfen (Nylar) do not kill adult fleas, but prevent flea larvae from turning into adults. IGRs are sold in a variety of formulations. Some combine IGRs with other pesticides. In general, products containing just IGRs have low toxicity to mammals, but are toxic to some aquatic organisms; therefore, limit the use of IGRs to indoor applications where the product won't get down an indoor drain.

Prevention

- **Restrict pets to a regular sleeping space** so you can focus cleaning efforts in fewer areas.
- **Use washable pet bedding** that can be gathered up easily by the four corners and laundered frequently. Soapy water destroys all flea stages.
- **For highly allergic people:** Protect yourself with a long sleeved-shirt and long pants tucked into socks. If the weather is hot, a pair of long white socks will offer some protection. Pick off fleas and drop them into soapy water. Apply repellents to shoes and clothing rather than skin.
- **Keep wild animals and rodents away from the house.** Patch holes or cover them with screen (1/4" hardware cloth) to prevent animals from getting in.

Products and Resources

Note that new products are constantly coming to the market. Brand names listed are for example only. No endorsement of specific products is intended nor is criticism implied of similar products that are not mentioned.

Insecticidal Dusts—Surefire® and Concern® Crawling Insect Killer

Hand Duster—Pest Pistol® (If unavailable locally, call 888-784-1722 to order.)

Borate-based Carpet Treatments—Fleanix® (If unavailable locally, call 415-459-4003 to order.)

Flea Trap—Raid® Flea Killer Plus

Insect Growth Regulators (IGRs)—Flea Control Capsules for Dogs, Hartz Control One Spot for Cats and Kittens

On Your Animal (available from vets)—Frontline® (Fipronil), Advantage® (Imidacloprid)

Ingested by Your Animal (available from vets)—Program® (Lufenuron)

Beneficial Nematodes—*Steinernema carpocapsae*. Available from Rincon Vitova, P.O. Box 1555, Ventura, CA 93002; 805-643-6267

For More Information

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Less Toxic Pest Management for SNAILS and SLUGS

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Amazing as it seems, the pest snails we try so hard to get rid of were originally imported from France for culinary purposes. Unfortunately, they escaped to become a major garden and agricultural problem. Snails and slugs are closely related. These two mollusks have soft, oblong bodies and produce quantities of slime to help them move around. Their most obvious difference is that snails have shells.

Detection

Are your vegetable and flower seedlings being devoured overnight? Are you finding large, ragged holes in your prized ornamentals? Do you see slime trails across your walkways? If so, your garden is probably harboring snails and slugs.

Snails and slugs are active mostly at night and on dark, cloudy days. On sunny days they can be found in moist, shady spots. Look for their eggs in the soil (about an inch down) or under rocks, boards, or plant debris. The eggs are laid in masses of up to 100 and resemble small pearls. When you find eggs, crush them or scoop them into a plastic bag, seal it, and put the bag in the garbage.

Less-Toxic Controls

Keeping snail and slug populations in check requires persistence. By using a combination of two or more of the following methods, you should be able to reduce the number of snails and slugs in your garden and keep their populations at acceptable levels.

Hand-pick at Night

- To be effective, hand-picking snails and slugs must be thorough and it must be done regularly. Collect nightly until it's hard to find them, then check once a week.
- The best time for hand-picking is after 10 or 11 pm when they come out to feed. You can go out earlier, but you won't find as many.
- A flashlight and pair of gloves or tongs will make collecting these slimy creatures easier.
- Crush snails and slugs completely (otherwise they may recover and slide away), or drown them in a pail of soapy water (they survive in plain water). A few dead snail and slug bodies left on the soil surface will attract more snails and slugs and make your collecting easier, but large piles will breed flies. Burying crushed mollusks 3" or 4" underground will add nutrients to the soil and avoid fly problems.

Use Barriers

- Before using barriers, hand-pick for a couple of nights. After barriers are in place, check for snails and slugs caught inside the barrier.
- Wrap a strip of copper foil around a tree trunk, flower pot, or the wooden sides of garden beds or fences. Snails and slugs are repelled by the unpleasant reaction between their bodies and the copper.
- Cover seedlings with small cages made from plastic or galvanized metal window screen. Push the cages into the soil so snails and slugs can't squeeze under.
- Cover rows of vegetables with special horticultural fabric (row cover) that lets in light and water but excludes snails and slugs and other pests.
- Use a coconut oil soap barrier to repel slugs and snails. Apply the material in a ring around individual plants.
- Snails and slugs may cross barriers such as diatomaceous earth, lime, sawdust, ashes, etc., especially when these barriers are wet. Lime, sawdust, and ashes can also be detrimental to your soil.

Use Traps

- Snails and slugs can be trapped under upside-down flower pots, dark-colored plastic sheeting, and wooden boards. Place these traps around the garden and collect snails and slugs in early morning.
- Homemade or commercial pit traps that use beer or yeast mixtures to lure snails and slugs to a drowning death may help, but hand-picking will probably still be necessary.

Encourage Natural Predators

Many common ground beetles kill snails and slugs. Most of these beetles are large (1" to 2"), black, tank-like creatures. They are found in the same moist habitats as their prey: under rocks, boards, leaves, etc. Avoid killing these allies.

Use Iron Phosphate Bait

- Choose a bait product carefully. Baits containing methiocarb kill earthworms and beneficial insects.
- Baits containing iron phosphate are safer for children and pets than baits containing metaldehyde. Nevertheless, always keep this and all other pesticides out of the reach of children and pets.
- After eating iron phosphate, snails and slugs stop feeding and die within 3 to 6 days. They often crawl into secluded places, so you may not see dead bodies.
- Reapply iron phosphate baits every 2 weeks.

Prevention

- Snails and slugs find large expanses of ivy, nasturtiums, or other succulent ground covers particularly attractive, and they love to hide in clumps of lilies, daffodils, agapanthus, or iris. If you can't remove the attractive plants, regularly search them for the pests.
- Plants with dry, hard leaves like rhododendrons, junipers, and bamboo are less attractive.
- Moisture makes an area much more inviting to snails and slugs. Avoid over watering and use drip emitters to deliver water only where it is needed. Water early in the day to allow the area to dry out before nightfall. It may be necessary to remove mulch from areas with severe problems.
- Remove any boards and flower pots that you aren't using as traps.

Products

Note that new products are constantly coming to the market. Brand names listed are for example only. No endorsement of specific products is intended nor is criticism implied of similar products that are not mentioned.

Copper Barrier: Surefire® Slug and Snail Copper Barrier Tape

Coconut Oil Soap Barrier: SlugStop®

Horticultural Fabric (Row Cover): Fast Start®, Seed Blanket

Baits containing Iron Phosphate: Sluggo®, Escar-Go®, Worry Free® Snail and Slug

For More Information

If you have questions about the information in this fact sheet, contact the Marin County Department of Agriculture at 415-499-6700, or the Bio-Integral Resource Center, PO Box 7414, Berkeley, CA 94707; 510-524-2567.

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SPIDERS the Helpful Hunters

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Spiders are beneficial creatures. Because they feed on large quantities of insects, they should be tolerated as much as possible in the home and garden. Spiders are not insects: they are classified as “arachnids” and have eight legs (insects have six legs).

Few Spiders are Dangerous

There are over 3,000 species of spiders in the U.S. and only a small number of these are dangerous to people. In the Bay Area the only spider to cause concern is the black widow (see below for more information). Brown recluse spiders do not live in California, although it is possible for them to be transported here from other parts of the country on furniture or other goods.

Cases of Mistaken Identity

People often think they have been bitten by a spider when the culprit is actually a flea, tick, mite, or even a disease condition or allergic reaction. Very few spiders are equipped with mouth parts that can pierce human skin. If the bites you are discovering are small, mild, and disappear within a day or two, there is nothing to be concerned about. Of course, if a bite affects a large area, is very painful, and/or is followed by dizziness, fever, nausea, or any other severe symptoms, seek medical advice immediately. Try to capture the offending spider, drop it into a small jar of rubbing alcohol, and save it for identification.

What Can I Do?

Harmless or not, the presence of spiders or their webs in the house is upsetting to many people. Unfortunately, spider webs are often associated with poor housekeeping, under the mistaken assumption that a “clean” house harbors no insects or spiders at all. On the contrary, spiders can be an asset to the conscientious housekeeper since they capture and consume many insects before the human residents ever see them.

Inside

- **Vacuum instead of spraying around the house for spiders.** If you cannot endure spiders or their webs in your home, the easiest and safest way to get rid of them is to vacuum up both spiders and webs. The dust inside the vacuum bag will quickly suffocate any spiders you catch. Make a periodic check of the areas where you most often find the eight-legged creatures.
- **Get rid of just the webs.** If you’re willing to try sharing your house with a few spiders, you can periodically vacuum up the webs that might be an eyesore or an embarrassment to you as a housekeeper. Leaving the spiders will allow them to continue to do their work.
- **Take spiders outside.** Catch spiders in a jar or yogurt container, cover the container with a piece of paper, and release outside.
- **Keep spiders out of the house.** Caulk cracks and crevices. Install screens on windows and doors.
- **Reduce their food supply.** What are those spiders eating? Ants? Keep things clean and store food properly (see also the Ant Fact Sheet). Fruitflies? Try storing ripening fruit in paper bags that are folded over twice and sealed with a large clip. Are they feasting on the insects attracted to a porch light? Try a yellow bulb. Are houseflies the problem? Install screens on windows and doors.

Outside

- **Don’t spray your garden or around the outside of your house to kill spiders.** Outdoors, spiders are providing a very useful pest control service. Leave them to do their job.
- **Change outside lighting.** Insects are attracted to lights, and spiders congregate where they find large numbers of insects. Try yellow bulbs in porch lights or move lighting away from areas where spiders and their webs may cause a problems. Replace mercury vapor lights with sodium vapor lights that are less attractive to insects.
- **Remove webs** with long-handled cleaning brushes or with a strong stream of water.

Black Widow Spiders

The black widow found in the Bay Area is *Latrodectus mactans*. The shiny black female usually sports a characteristic red hour-glass shaped mark on the underside of her abdomen. The brown recluse spider, another poisonous spider, is not a problem in the Bay Area.

Black widows are not common in the Bay Area, and deaths from bites are rare. In many people, symptoms are not significant enough to warrant medical treatment. Bites are of most concern for the very young, the very old, and those who are seriously ill.

Black widows are not aggressive and they are rarely encountered by people.

- Black widows are timid. They make no effort to attack, preferring to lie still or retreat.
- Ordinarily, black widows are reluctant to bite, even when provoked.
- These spiders spend their lives in their webs waiting for prey. They do not go out hunting.

Where are black widows found?

- Usually (but not always) near the ground
- Dark, dry, protected crevices in and around buildings
- Lower portions of seldom-used cupboards, closets, or other dark, dry storage areas.
- Woodpiles, lumber piles, or rock piles
- Stacked patio furniture, flower pots, or baskets
- Rodent burrows
- Water meter boxes
- Irrigation control boxes
- Around railroad tracks

How to Avoid Bites

- Wear gloves to clean up garages, debris or woodpiles outside, and relatively undisturbed storage areas inside.
- Teach children not to tease spiders in their webs or to poke bare fingers into dark cracks and crevices.
- Always look where you place your hands when doing outdoor work.

How to Inspect for Black Widows

Use a flashlight or headlamp to find them. At night these spiders move to the center of their webs and are more visible.

What to do about Black Widow Spiders

- If you find certain locations where black widows regularly build webs, try to modify these areas to make them less attractive by increasing the amount of light, caulking crevices, or reducing the insect population the spiders are feeding on.
- Reduce possible black widow habitat by removing debris and woodpiles outdoors. Inside, remove clutter and clean and vacuum storage areas regularly.
- If you have small children, caulk crevices in foundation or other walls that are child height and wide enough for a finger.

For More Information

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Less-Toxic Pest Management for YELLOWJACKETS

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With their potent sting, yellowjackets can be menacing creatures when it comes to a showdown over the picnic table. In years when the spring is warm and dry, yellowjacket populations can increase to the point of making outdoor activities difficult. But few people are aware that yellowjackets are voracious predators of insect pests such as caterpillars and flies.

Identification and Detection

Yellowjackets are a type of wasp but they are often mistaken for bees. Sometimes they are confused with other less aggressive predatory wasps, especially paper wasps. Yellowjackets are very protective of their nests and will aggressively defend them.

Less-Toxic Controls

Removing an Individual Yellowjacket from Inside the House

- Do not aggravate a yellowjacket by swatting at it.
- Do not squash a yellowjacket. When crushed, many yellowjacket species emit a chemical that can cause other nearby yellowjackets to attack.
- Wait until the yellowjacket lands on a flat surface.
- Place a glass or plastic container over the insect and slide a stiff piece of paper under the opening of the container.
- Seal the container and place it in the freezer overnight or take it outside and release the wasp.

If you are finding many yellowjackets inside, you may have a nest in a wall void.

Destroying Nests

- Because of the danger of multiple stings, we recommend calling a professional who has experience working with bees and wasps.
- Yellowjackets build nests in abandoned rodent burrows and other holes in the ground, in attics, in wall voids, in shrubs and trees. Sometimes they hang their nests from eaves.

Trapping Yellowjackets

Traps can provide temporary relief from yellowjackets when you plan to eat outdoors, but don't leave traps out for more than a few days at a time because yellowjackets can learn to escape. There are a number of traps on the market, some disposable and others reusable. Experiment to find the trap or traps that work best for you.

- Place a number of the traps around the periphery of your yard or picnic area to lure the wasps away from your activities and food.
- To make trapping more effective, set the traps out well before outdoor activities begin.
- If a trap in one location is not attracting wasps, move it.
- If none of the traps attracts yellowjackets even though the wasps are present, try changing the bait. (Use baits such as tuna-flavored cat food in the spring and early summer. Try using grenadine or the attractants that come with the traps in late summer and fall.)
- Wasps caught in reusable traps can be killed by submerging the traps in a pail of soapy water, or putting the traps in a plastic bag and setting them in the sun.

Poison Baiting

As a last resort in years when yellowjacket populations are extremely high, poison baiting may be necessary. Call a pest control professional.

Prevention

- Seal holes and cracks in foundations, walls, roofs, and eaves to prevent yellowjackets from entering your home.
- Cover attic and crawl space vent coverings with fine mesh insect screen.
- Yellowjackets scavenge for meat and sweet foods and drinks in outdoor garbage and recycling bins. Clean recyclables before storing them. Keep garbage cans clean and tightly covered or seal all food garbage in plastic bags.

Why Yellowjackets Sting

Yellowjackets seldom sting when they are foraging for food, unless they feel threatened. They are most likely to sting when their nests are disturbed by a direct blow or by vibrations that are detected by the wasps inside. Mowing the lawn near an underground nest, construction work near a nest in a wall void, or even merely walking near a nest can provoke an attack by one or more yellowjackets. This is especially true if the nest has been disturbed before.

Avoiding Stings

When a wasp approaches

- Remain calm.
- *Do not* strike at a yellowjacket with sharp, sudden blows. Slow, gentle movements that mimic the movement of a branch in the breeze will be safer in encouraging the wasp to leave.
- Brush the yellowjacket off with a piece of paper or some other object but be sure to move slowly and deliberately.

During yellowjacket season, the following tips will help prevent stings. Yellowjackets can be a problem in May and June, but they are most noticeable and annoying late in the summer.

- **Wear protective clothing** when mowing grass where you suspect underground nests.
- **If you are hypersensitive to yellowjacket stings**, avoid outdoor cooking or eating. Wear clothing that covers as much skin as possible, and carry an epinephrine kit (available by prescription) at all times.
- **Do not drink soft drinks or other sugary drinks from open containers.** Use cups with lids and straws, and look before you sip. Do not carry snacks containing meat or sugar in open containers.
- **Do not wear perfumes.** Use unscented deodorant, sun screen, hair spray, etc.
- **Wear light-colored clothing without patterns.**
- **Avoid going barefoot, especially in vegetation.**
- **Always examine wet towels or wet clothing before handling them.**

Products

Note that new products are constantly coming to the market. Brand names listed are for example only. No endorsement of specific products is intended nor is criticism implied of similar products that are not mentioned.

Traps:

- Rescue!® Yellowjacket (disposable)
- Rescue!® Trap (reusable)
- Surefire® Deluxe Yellowjacket and Wasp Trap
- Victor® Yellowjacket and Flying Insect Trap.

For More Information

If you have questions about the information in this fact sheet, contact the Marin County Department of Agriculture at 415-499-6700, or the Bio-Integral Resource Center, PO Box 7414, Berkeley, CA 94707; 510-524-2567.

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School IPM Program: Specifically for Parents and Teachers: IPM Articles

IPM Articles for School Newsletters

In order to help us spread the word about IPM and the Model School IPM Project, we hope you will include these articles in your school or PTA newsletter.

Note: For text, see Appendix L.

Resources and Organizations

Resources and Organizations

There are many excellent sources of pesticide information on the Web. Below are just some of the organizations nationwide that are working to protect human health and the environment from hazards derived from pesticides. These resources and organizations can help you learn about pest management and reducing pesticide use.

Alternatives to Pesticides

Government

Pesticides, Health, and the Environment

Pesticide Information

Pesticide Reform Organizations

Alternatives to Pesticides

Bio-Integral Resource Center [<http://www.birc.org/>]

BIRC's staff are nationally recognized experts on alternatives to pesticides. BIRC offers extensive information about least-toxic solutions for home, garden, schools, parks and public spaces. BIRC publishes *The IPM Practitioner* and *Common Sense Pest Control Quarterly*.

LifeGarden [<http://www.LifeGarden.org>]

Provides resources and links to healthy garden/sustainable garden practices for home, community and school gardens. Offers eco-tours, publications, and classes and workshops for all ages on healthy garden practices including IPM and organic methods.

National Pediculosis Association [www.headlice.org]

This is the web site of the National Pediculosis Association which seeks to protect children from misuse and abuse of potentially harmful lice and scabies treatments. They produce various publications as well as the LiceMeister web site.

Northwest Coalition for Alternatives to Pesticides [<http://www.pesticide.org/>]

Oregon-based organization. Publishes the *Journal of Pesticide Reform* and pesticide fact sheets.

United States Environmental Protection Agency - IPM School Manual

[www.epa.gov/region09/toxic/pest/school]

Here you can read *IPM for Schools: a How-to Manual*. This 200 page handbook was originally written for the EPA by the Bio-Integral Resource Center (BIRC) and contains information about starting an IPM program and managing more than 15 different pests common in schools. This manual is being updated and revised to fit the needs of California schools. It will be available in the summer of 2002 from the Department of Pesticide Regulation.

Government

California Department of Pesticide Regulation [<http://www.cdpr.ca.gov/>]

The web site of the California Department of Pesticide Regulation provides information on school IPM, the Healthy Schools Act, pesticides, and pesticide registration.

California Environmental Protection Agency [<http://www.calepa.ca.gov/>]

Contains information regarding environmental interests and concerns as well as Cal/EPA boards, departments, and offices.

State of California [http://www.ca.gov/state/portal/myca_homepage.jsp]

Go to *Environment and Natural Resources*, then *Safeguarding California's Environment* for information about pesticides.

Pesticides, Health, and the Environment

Children's Environmental Health Network [<http://www.cehn.org/>]

Organization that has a wide variety of information about the health effects of toxic chemicals on children as well as information on other organizations and agencies that deal with this subject.

Environmental Defense Fund Scorecard [<http://scorecard.org/chemical-profiles/>]

Information about polluters and chemical releases nationwide, searchable by ZIP code or area.

National Resources Defense Council: Toxic Chemicals and Health

[<http://www.nrdc.org/health/default.asp>]

Information about the health threats posed by toxic chemicals.

Pesticide Information

California Department of Pesticide Regulation [<http://www.cdpr.ca.gov/>]

See above.

EXTOXNET [<http://ace.orst.edu/info/extoxnet/pips/ghindex.html>]

A joint effort of UC Davis and Oregon State University that provides excellent pesticide profiles and other information about toxics.

NCAP Pesticide Factsheets [<http://www.pesticide.org/factsheets.html>]

PDF versions of Journal of Pesticide Reform and extensive profiles of many commonly-used pesticides.

Rachel Carson Council [<http://members.aol.com/rccouncil/ourpage>]

Pesticide profile excerpts from their comprehensive Basic Guide to Pesticides; provides information at both scientific and layperson levels on pesticide-related issues and answers to the public.

United State Geological Survey [<http://ca.water.usgs.gov/pnsp/>]

Pesticide National Synthesis Program tracks and reports on pesticides in water resources.

Pesticide Reform Organizations

Californians for Pesticide Reform [<http://www.igc.org/cpr/>]

Broad-based coalition of public interest groups dedicated to eliminating hazardous pesticide use.

Californians for Alternatives to Toxics [<http://www.alternatives2toxics.org/>]

Provides information to help in preventing harm caused by the unwise use of toxic chemicals in the environment, particularly pesticides. Focus is on problems that occur in Northern California.

Beyond Pesticides/National Coalition Against the Misuse of Pesticides

[<http://www.beyondpesticides.org/>]

A national network of membership organizations committed to pesticide safety and adoption of IPM strategies that reduce or eliminate chemical use.

Northwest Coalition for Alternatives to Pesticides [<http://www.pesticide.org/>]

See above.

Pesticide Action Network [<http://www.panna.org/>]

International pesticide reform organization. Subscribe to their weekly online news service, PANUPS for pesticide-related news.

Pesticide Watch and Pesticide Watch Education Fund [<http://www.pesticidewatch.org/>]

Sister organizations dedicated to reforming pesticide use in California communities.

Rachel Carson Council [<http://members.aol.com/rccouncil/ourpage>]

See above.

General Program News and Information

Progress Reports: Model School IPM Project, 2001

Final Report: Model School IPM Project, 2001

Upcoming Projects

What's New

Progress Reports: Model School IPM Project, 2001

(see Attachments: Progress Reports I & II)

Upcoming Projects

Using our year and a half of experience working on the Model School IPM Plan in Marin County, we will expand our project to disseminate information about IPM and the Healthy Schools Act to schools in four other counties: Madera, Solano, Contra Costa, and Alameda.

Compliance with the Healthy Schools Act in Marin County has been high because of our concerted efforts to educate each superintendent and IPM coordinator about the requirements of the law. With the help of county agricultural commissioners, we will mount similar educational campaigns in our other four counties.

In Marin County we will concentrate on providing additional training for IPM coordinators and maintenance directors and facilitating the sharing of pest management information across the County. We will also implement a pilot project to demonstrate and teach landscape IPM monitoring and record keeping.

Working with the Madera County Agricultural Commissioner, we will use materials and strategies developed in Marin County to begin an IPM project in a Madera school that can serve as a model for the county and surrounding areas. Working in this geographical area will provide us with valuable information about implementing IPM in a community in the Central Valley as opposed to coastal California.

In Solano, Contra Costa and Marin Counties, we will begin a train-the-trainer program for IPM coordinators and maintenance directors in both landscape and structural IPM for schools.

By helping schools to adopt IPM and reduced-risk pest management practices, these projects will improve the quality of pest management in schools, reduce the need for highly toxic pesticides, lessen the potential for worker exposure to pesticides, and protect surface and ground waters. One of the most important benefits of these projects will be to decrease the risk of exposure to pesticides of California's school children.

Links to Additional Information and Resources

American Farmland Trust [www.farmlandinfo.org]

The American Farmland Trust (AFT) web site offers information covering trends and policies related to farmland use and agricultural land preservation.

Beyond Pesticides/National Coalition Against the Misuse of Pesticides [www.beyondpesticides.org]

Beyond Pesticides/National Coalition Against the Misuse of Pesticides (NCAMP) is a national network of membership organizations committed to pesticide safety and adoption of IPM strategies that reduce or eliminate chemical use.

Bio-Integral Resource Center [<http://www.birc.org/>]

BIRC's staff are nationally recognized experts on alternatives to pesticides. BIRC offers extensive information about least-toxic solutions for home, garden, schools, parks, and public spaces. They publishes two journals: *The IPM Practitioner* and *Common Sense Pest Control Quarterly*. They also publish *IPM for Schools: A How-to Manual*, the *Annual Directory of Least-Toxic Pest Control Products*, and booklets on a wide variety of pest management subjects.

BioQuip [www.bioquip.com]

The BioQuip company sells pest management literature and supplies.

California Department of Food and Agriculture [www.cdfa.ca.gov]

The California Department of Food and Agriculture web site provides information covering department programs and services, press releases, regulations, and publications. A listing of current events and an excellent resources directory are available.

California Department of Pesticide Regulation [www.cdpr.ca.gov]

The web site of the California Department of Pesticide Regulation provides information on school IPM, the Healthy Schools Act, pesticides, and pesticide registration.

The California Exotic Pest Plant Council [www.caleppc.org]

The California Exotic Pest Plant Council (CalEppc) provides information on noxious weeds.

Californians for Pesticide Reform [www.igc.org/cpr]

Californians for Pesticide Reform (CPR) is a coalition of over 140 public interest organizations committed to protecting public health and the environment from pesticide proliferation. CPR's Healthy Schools Campaign works to pass and implement IPM policies in school districts across the state.

Cornell University - Material Safety Data Sheets [www.msds.pdc.cornell.edu]

This web site allows the user to obtain material safety data sheets for most chemicals and pesticides used in the United States.

EXTOXNET [<http://ace.orst.edu/info/extoxnet>]

A joint effort of UC Davis and Oregon State University that provides excellent pesticide profiles and other information about toxics.

The Integrated Plant Pest Center [www.ippc.orst.edu/cicp]

The Integrated Plant Pest Center (IPPC) directory offers links to national and regional collaborative IPM efforts and successful IPM programs developed between public and private partnerships.

The IPM Institute [www.ipminstitute.org]

Resources for school IPM, links to other pest management resources, discussion of IPM standards with accompanying assessment forms.

National Biological Control Institute [www.aphis.usda.gov/ppq/nbci/]

This is the web site of the National Biological Control Institute

National Pediculosis Association [www.headlice.org]

This is the web site of the National Pediculosis Association which seeks to protect children from misuse and abuse of potentially harmful lice and scabies treatments. They produce various publications as well as the LiceMeister web site.

Pesticide Watch [www.pesticidewatch.org]

Pesticide Watch education Fund works with individuals and community groups to assist in local efforts to reduce pesticide use and promote safer pest management methods.

Sudden Oak Death [www.suddenoakdeath.org]

The Sudden Oak Death web site provides information developed by the California Oak Mortality Task Force (COMTF) and various committees involved in research, management, regulation, and education around this disease.

United States Department of Agriculture [www.usda.gov]

The USDA web site contains information covering national farm services, food and nutrition, food safety, marketing and regulation programs, research, and departmental administration. It contains links to various other Federal and State agencies and private organizations.

United States Department of Agriculture National Organic Program [www.ams.usda.gov/nop]

The USDA National Organic Program web site contains information on the National Standards on Organic Agriculture, and on certification, accreditation, and frequently asked questions about organic food production, handling, and sales.

United States Environmental Protection Agency - IPM School Manual

[www.epa.gov/region09/toxic/pest/school]

Here you can read *IPM for Schools: a How-to Manual*. This 200 page handbook was originally written for the EPA by the Bio-Integral Resource Center (BIRC) and contains information about starting an IPM program and managing more than 15 different pests common in schools. This manual is being updated and revised to fit the needs of California schools. It will be available in the summer 2002 from the Department of Pesticide Regulation.

The University of California - Davis [www.ipm.ucdavis.edu/general/links.html]

The University of California offers an extensive list of IPM related links listing government and educational institutions covering entomology, plant pathology, weed science, and special projects including a national directory of all land-grant universities.

University of Florida - School IPM [www.ifas.ufl.edu/~schoolipm]

The school IPM section of the University of Florida web site contains much useful information for schools. Using their school IPM list serve (SCHOOLBUGS-L@LISTS.UFL.EDU) you can ask questions about school IPM or pest management problems and get opinions from across the country.

Appendix Q

- **List of IPM Exposition Participants**

List of IPM Expo Participants

Last Name	First Name	Organization	Address	City	Zip	Work Phone	Email
		Albany Unif Schl Dstrct	904 Talbot Avenue	Albany	94706		
Dahlquist	Mike		701 W 18th Street	Antioch	94509		
Smith	Ray	LA Co. Agri. Dept.	12300 Lower Azusa Road	Arcadia	91006	626-575-5462	ray@acwm.co.la.ca.us
Macy	Douglas		13101 Bill Francis "Drive	Auburn	95603	530-263-1951	dmacy@placer.k12.ca.us
Zapper	Russ		275 Orange Street	Auburn	95603		rzapper@puhsd.k12.ca.us
Joseph	Ann	Ann Joseph Consulting	675 Belvedere	Benecia	94510	707-747-1786	
Franklin	Windy		2545 California Street	Berkeley	94703		
Pacelli	Frank		6 Karen Court	Burlingame	94010		
Young	Richard		812 Fairfield Road	Burlingame	94010	650-579-1197	
Madrigal	Chris	Madrigal Vineyard Management	P.O. Box 937	Calistoga	94515	707-942-6577	madrigal@napanet.net
Madrigal	Jesus	Madrigal Vineyard Management	P.O. Box 937	Calistoga	94515	707-942-6577	
Shutter	Greta		2928 Larkspur Lane	Camino	95709	530-647-0726	
Payton	Chuck		75-c Cristich Lane	Campbell	95008	408-559-0933	
Webber	Whitney		5408 St. Anton Court	Carmichael	95608		wwebber@arb.ca.gov
Garza	Luisa	Calif. State University Chico		Chico	95929	530-898-4039	lgarza2@csuchico.edu
Murphy	Ray	George's Pest Control	P.O. Box 8600	Chico	95927	530-345-2424	Debbie_Raphael@ci.sf.ca.us
Carter	Nike	Mt. Diablo Unif Schl Dstrct	1480 Gasoline Alley	Concord	94520	925-825-7740	
Case	Bob	Contra Costa Dept. of Ag.	2366 A Stanwell Circle	Concord	94520	925-646-5250	bcase@ag.co.contra-costa.ca.us
Chamberlain	John	City of Walnut Creek	4467 Crestwood Circle	Concord	94521	925-689-1720	Orchids@pacificbell.net
Kummen	Pat	Mt. Diablo Unif Schl Dstrct	1480 Gasoline Alley	Concord	94520	925-825-7740	
Pedersen	Pete	Mt. Diablo Unif Schl Dstrct	1480 Gasoline Alley	Concord	94520	925-825-7740	
Uemura	Dave	Mt. Diablo Unif Schl Dstrct	1480 Gasoline Alley	Concord	94520	925-825-7740	
Walker	Connie	Mt. Diablo Unif. Schl Dstrct	1480 Gasoline Alley	Concord	94520	925-825-7740	

Yost	Larry	Contra Costa Dept. of Ag.	2366 A Starwell Circle	Concord	94520	925-646-5250	lyost@aq.co.contra-costa.ca.us
Ventura	Susan		10397-B Meadow Place	Cupertino	95014		venturasusan@hotmail.com
Cassin	James	San Francisco State Univ.	217 Wilshire Avenue	Daley City	94015	415 338-6072	jcassin@sfsu.edu
Goldberg	Janine		11 Grave Street	Daley City	94014		
Van Kirk	Kathryne		424 Hillside Blvd.	Daly City	94014		
Damey	Jules		P.O. Box 1694	Davis	95617		
Flanagan	Stephan		1530 Drew	Davis	95616		sflanagan@agraquest
Nunes	Kenneth		187 Full Circle	Davis	95616		
Kelly	John		1736 Wesley Avenue	El Cerrito	94530		
Cohen	Susan	Solano Co. Ag. Com.		Fairfield			
DWilliams	Ed	Fairfield-Suisun Unif Schl Dstrct	1975 Pennsylvania	Fairfield	94533	707-421-3919	
Connolly	Karen		P.O. Box 29	Foresthill	95631		
Francone	Karen		1730 S. Maple	Fresno	93702		kfrancone@fresnocounty.ca.gov
Muhammad	Jardali		5230 E. Townsent Avenue	Fresno	93727	559-255-7613	
Martinez	Severo		31334 Pudding Creek	Ft. Bragg	95437		
	Russ		11680 Hidden Hollow Place	Grass Valley	95945	530-263-1951	
	Vince		11680 Hidden Hollow Place	Grass Valley	95945	530-263-1951	
Farmer	Mike	The Flea Patrol	LPC Services, Inc.	Hayward	94541	707-745-9174	
Gee	Gregory		224 W. Winter Avenue Room 184	Hayward	94544		ggee@co.alameda.ca.us
Thompson	Matthew		721 College St.	Healdsburg	95448		
Thompson	Aaron		803 Benjamin Way	Healdsburg	94544	707-433-9065	
Carr	Rollie	Hillsborough City Schl Dstrct	300 El Cerrito Avenue	Hillsborough	94010	650-342-5193	msmith@hcsd.k12.ca.us
Turner	Dan		804 Monte Vista Lane	HMB	94019		
Tognazzini	Mark	San Benito Co. Ag. Com,	P.O. Box 699	Hollister	95023		
Clark	Barry	Amador Co. Dept. of Ag.	12200 Airport Road	Jackson	95642	209-223-6487	
McNeal	Jim	California Exterminators	3173 S. Lake Drive	Kelseyville	95451	707-277-9103	
Kuivenhoven	Kris	Kentfield School District	250 Stadium Way	Kentfield	94904	415-925-2230	
Brooks	Larry	Corky's Pest Control	P.O. Box 1519	Lafayette	94549		

Cunningham	Marvin		185 East D Street	Lemoore	93245	559-730-7538	mcunningham@visalia.k12.ca.us
Parker	Mike	Clark pest Control	405 West Pine Street	Lodi	95241	209-368-715?	m.parker@clarkpest.com
Rodriguez	Vince		P.O. Box 1143	Loomis	95650		
Atherton	Jeff	Madera Unif Schl Dist	1205 Madera Avenue	Madera	93637	559-675-4500	
Dana	Wilbur	Madera Unif Schl Dstrct	1205 Madera Avenue	Madera	93637	559-675-4500	
Rodriguez	Lupe	Madera Unif Schl Dstrct	1205 Madera Avenue	Madera	93637	559-675-4500	
Vian	Delfino		P.O. Box 4136	Menlo Park	94026	650-322-7414	drvian@cs.com
Bishop	Gary	City of Merced	835 West 22nd Street	Merced	95340	209-388-6800	
Clinton	Sam		695 Camino Del Canyon	Mill Valley	94941		
Cummins	Thad		572 Seaver Drive	Mill Valley	94941		
Wase	John	Wade Pest Management	5112 Shoemake Ave	Modesto	95358	209-577-3452	
Franks	James	MPUSD	P.O. Box 1031	Monterey	93940	831-899-3380	
Kemmerer	Vicki	Napa County Ag. Comm.	1710 Soscal Avenue Suite 3	Napa	94559	707-253-4357	vkemmere@co.napa.ca.us
Evans	Mark		6165C Thomton Avenue	Newark	94560	510-793-2420	
Nachand	Michelle		36394 Cupress Point Drive	Newark	94560	408-299-8923	
Simas	Fernando		890 Main Street	Newman	95360		
Warfield	Ron	Novato School District	819 Olive Ave.	Novato			
Bertotti	Kim	Bertotti Landscaping	717 Atherton Avenue	Novato	94945	415-897-8517	kimb@bertotti.com
Dolar	Drago		2000 Feliz Road	Novato	94945	415-892-3049	dragod@cmc.net
Finch	Jason		1000 Ignacio Blvd #51	Novato	94949		
Ingold	Dale		30 A Pamaron Way	Novato	94949	415-898-9800	
McCarron	Matt		4 San Miguel Court	Novato	94945		mmccarro@pac.calepa.ca.gov
Pitsenbarger	Donald	San Raphael Schools	21 Brichard Street	Novato	94947	415-485-2447	
Rothschild	Blake	Bertotti Landscaping	717 Atherton Avenue	Novato	94945	415-897-8517	kimb@bertotti.com
		Cagwin & Dorward	P.O. Box 1600	Novato	94948		
Carr	James	Eureka Valley Pest Exclusion	P.O. Box 1896	Pacifica	94004	415-577-5766	evpest@yahoo.com
Sian	Lou		P.O. Box 1186	Pacifica	94044		lou_sian@ci.sf.ca.us
Dawson	Barbara		2365 Emerson Street	Palo Alto	94301	325-7530	

Maraboli	Sergio		118 Feme Avenue	Palo Alto	94306		
Duff	Bryan		115 Rene Drive	Petaluma	94954		
Sawyer	Wayne	Petaluma City Schools	P.O. Box 5603	Petaluma	94955	707-585-2901	
Cwynar	Bill	Piedmont USD	800 Magnolia	Piedmont	94611	510-595-8173	
Lundin	Christopher	Tree Health Care	345 Olive Avenue	Piedmont	94611	510-652-8519	lundin@mac.com
Cortinas	Alex		P.O. Box 236	Planada	95365		
Russell	Cindy		112 Foxwood Road	Portola Valley	94028		
Evans	Richard	Raisin City Elementary School	P.O. Box 69	Raisin City	93652	559-233-0128	revans@fcoe.net
Kjos	Paul		3179 Bechelli Loane	Redding	9600?		pkjos@pacbell.net
Mastrangelo	Maria	San Mateo CAC	p.O. Box 999	Redwood City	94064	650-363-4700	forbats@jps.net
Frazier	David	West Contra Costa USD	125 So. 8th Street	Richmond	94804	510-620-2188	
Norris	Anthony		3201 Leona Avenus	Richmond	94804		
Sherman	Terry	West Contra Costa USD	125 So. 8th Street	Richmond	94804	510-233-0104	
Slater	Art	Slater's Pest Control	636 Amador Street	Richmond	94805		
Anderson	Lonnie	Terminex	4847 Blyado Road	Rocklin	95765	916-624-1828	
Studer	Rick		5561 Cabrillo Court	Rocklin	95765		
Pedersen	Jay	Sonoma State University	1801 E. Cotati	Rohnert Park	94928		shanjay@sonic.net
Lemon	Martin		2240 Douglas Blvd. #260	Roseville	95661		
Maccario	Robert		P.O. Box 320	Ross	94957		
Ennes	Darrell		2480 Valley Rd.	Sacramento	95821	916-481-1730	
Gough	George		4240 C St.	Sacramento	95819	916-456-4263	
Jensen	Julie		4137 Branch Center Road	Sacramento	95827		
Lenz	Keith		P.O. Box 19505	Sacramento	95819		
Pierce	Bill		3325 Longview Drive	Sacramento	95660		
Schultz	Brian	Falcon Services	P.O. Box 233350	Sacramento	95758	800-278-0444	vfalconservices@aol.com
Turner	Nicoe		6018 Machado Way	Sacramento	95822		mturner@kenanassoc.com
Vietheer	Karen	Sacramento Co. Ag. Dept.	4137 Branch Center Road	Sacramento	95827		
		City Farms	P.O. Box 19505	Sacramento	95819		
Epperson	John	Salida Union Schl Dstrct		Salida	95368	209-545-1355	
Mullen	Erin	Salida Union Schl Dstrct		Salida	95368	209-545-1355	
Rameriz	Gregory		283 E. Alisal	Salinas	93901		

		DeAngelo Pest Control	P.O. Box 2298	Salinas	93902	408-753-6170	
Rice	Kenneth		P.O. Box 3005	San Anselmo	94979		
Lewis	Thomas	City of San Bruno	567 El Camino Real	San Bruno	94066	650-877-8873	
Gemty	Sharon	San Diego Co. Ag Com.'s Office	5555 Overland Avenue Building 3	San Diego	92123		
Burgess	Bodhi		249 Hoffman Ave.	San Francisco	94114	415-648-2124	
Burke	Tom		145 San Francisco Blvd.	San Francisco	94960	415-456-4888	
Cangioli	Clare	City of San Francisco		San Francisco			
Conforti	Christa		P.O. Box 19520	San Francisco	94107		cconforti@presidiotrust.gov
Dake	Stu	San Francisco Intl. Airport	P.O. Box 8097 Bldg. 682	San Francisco	94128		joegmnds@usd.k12.ca.us
Lee	Steve		2679 16th Street	San Francisco	94116		
Minsta	Charles		P.O. Box 210753	San Francisco	94121		
Morgan	Patrica	City Coll. of S F	50 Aphelan Avenue	San Francisco	94112	415-239-3236	pmorgan@csf.org
Niemann	Valerie	City of San Francisco	1359 S. Van Ness Avenue	San Francisco	94110	415-666-7017	
Pree	Stephen	City of San Francisco		San Francisco			
Raphael	Debbie	SF IPM Coordinator	Department of the Environment	San Francisco	94301	415-554-6399	
Rossi	Philip	SF Rec. and Park Dept	501 Stanyan Street	San Francisco	94117	415-753-7249	Phil-Rossi@ci.sf.ca.us
Tom	Warren		6214 California Street	San Francisco	94121		rtom@presidiotrust.gov
Wardlaw	Al		2892 23rd Street	San Francisco	94110		
Charlson	William	CAPCA	1018 Bird Avenue	San Jose	95125	408-294-2660	mrbillc@wwc.com
Christensen	Culley		1500 N. 4th Street	San Jose	95112		
Christensen	Natalie		508 S. 11th Street No. 12	San Jose	95112	408-295-5256	
Lea	Mark		915 Bougainvillea Street	San Luis Obispo_	93401	805-541-5433	
Aguilar	Javiar	Gardeners Guild	2143 E. Francisco Blvd.	San Raphael	94901	415-457-0400	gardguild@aol.com
Cervantes	Agustin	Gardeners Guild	2143 E. Francisco Blvd.	San Raphael	94901	415-457-0400	gardguild@aol.com
Cervantes	Ruben	Gardeners Guild	2143 E. Francisco Blvd.	San Raphael	94901	415-457-0400	gardguild@aol.com
Koczmarek	Rod	Naturworks Pest Control	P.O. Box 2457	San Raphael	94912	415-460-6900	ron@naturworks.com

Lavine	Richard	Peacock Gap Golf Course	333 Biscayne Dr.	San Raphael	94901	415-454-6450	rlavine@golfsat.net
Minnear	Ray	Gardeners Guild	2143 E. Francisco Blvd.	San Raphael	94901	415-457-0400	gardguid@aol.com
Montana	Ralph		715 Pine Lane	San Raphael	94903		
Rosal	George	Mt. Tamalpais Cemetery	2500 5th Avenue	San Raphael	94901	415-459-2500	
Aldridge	Mahlon	Ecology Action	P.O. Box 1188	Sant Cruz		831-426-5925	emahlon@ecoact.org
Boise	Phil	Community Environmental Council	930 Miramonte Dr.	Santa Barbara	93109	805-963-0583 x150	pboise@rain.org
Eabry	Kim		P.O. Box 8132	Santa Cruz	95061		keabry@sasquatch.com
Mahoric	Greg	Cal-Trans	195 Capitola Road Extension	Santa Cruz	95062	831-476-1337	greg_mahoric@dot.ca.gov
Reid	Michael	Cardiff Pest Control	2701 Soquel Avenue	Santa Cruz	95062	831-475-4214	buglove@pacbell.net
Bruskotter	Karl	City of Santa Monica	200 Santa Monica Pier Suite 1	Santa Monica	90401	310-458-2255	karl-bruskotter@santamonica.org
Heldt	Larry	Santa Rosa City Schls-Maint.	211 Ridgway Avenue	Santa Rosa	95401		
LoCoco	Tom		55 Stony Point Road	Santa Rosa	95403		tlcococo@ci.santa-rosa.ca.us
Lopez	Susannah	Yard Maintenance	1147 Santa Catalina Way	Santa Rosa	95404	707-545-9234	
Osburn	Ben		4381 Parker Hill Rd.	Santa Rosa	95404	707-538-5178	osburn@aol.com
Pantone	Frank	Golden Gate Landscape	901 7th Street	Santa Rosa	95404	707-546-6660	gglandscape@bigplanet.com
Peterson	Duane	Santa Rosa City Schls-Maint.	211 Ridgway Avenue	Santa Rosa	95401		
Rapisardo	Matthew	City of Santa Rosa	346 Los Alamos Rd.	Santa Rosa	95409	707-539-5951	nhi187@aol.com
Umehara	Mike	Overall Landscaping/Momiji Nursery	2765 Stony Point Road	Santa Rosa	95407	707-528-2917	
Zeponi	Dan		20130 5th Street	Sonoma	95476		
Rehgaleic	Richard		P.O. Box855	Stinson Beach	94970		dendron@well.com
Douglass	Andre		3102 Ginkgo Court	Stockton	95212		
Fidler	Michael		P.O. Box 218	Talmage	95481	707-463-1412	
Hoppen	Steve		707 Onyron Place	Ukiah	95482		
Koozer	Joe	Ukiah Unif. Schl Dstrct	710 Maple Street	Ukiah	95482	707-463-5233	aprounc1@aol.com

Bauer	Kenneth		P.O. Box 551	Vacaville	95696		
Rathke	James		850 La Cruz Lane	Vacaville	95687		
Briceno	Bernie		108 Lofas Place	Vallejo	94589		
Stadin	Hope		1021 Scandia Ave. Apt 7	Ventura	93004	805-486-4435	
Lowell	R	Walunt Creek School District	960 Ygnacio Valley Road	Walnut Creek	94596	944-6850	
Rogers	Bethallyn		1205 Lindell Dr.	Walnut Creek	94596	510-932-4252	bbrogers@ucdavis.edu
Voss	C	Walunt Creek Schl Dstrct	960 Ygnacio Valley Road	Walnut Creek	94596	944-6850	
Paulsen	Eric		3031 Beacon Blvd.	West Sacramento	95691		eric@poc.org
Rodriguez	Frank	Windsor School District	10725 Old Redwood Highway	Windsor	95492	707-837-7796	xrodfr41@aol.com
Izquierdo	Humberto	Yolo Co. Dept. of Ag.	70 Cottonwood Street	Woodland	95695	530-666-8140	
Amdt	Tom	GSD					
Bramlett	John	Santa Cruz USD					
Drew	Joe	GSD					
Gutierrez	Mario	Kings Co. Ag. Comm Off.	680 Campus Drive Suite B			559-582-3211 x2830	
Tamori	Bob	GSD					
Taylor	Elbert	Clark pest Control	485 Oneill Avenue			650-620-9537	e.taylor@clarkpest.com
Twiford	Karl		515 John Muir Drive				ktwiford@clirtex.com
Bernard	Dr. John	Superintendent, Novato USD					
Burke	Mary Jane	Marin Co Supt. of Schools					
Helliker	Paul	DPR					
Murray	Cynthia	Marin Co. Supervisor					
Nation	Joe	6th Assembly District					
Stacy	Carlsen	Marin Co Ag Comm					

Appendix R

- **IPM Expo Promotional Materials**

IPM Expo Promotional Materials

Attachments

- **Progress Report I**
- **Progress Report II**

Progress Report I

First Progress Report for Department of Pesticide Regulation

Contract No. 99-0251

Model Integrated Pest Management Plan for Schools

Stacy Carlsen, Principal Investigator

Tanya Drlik, Project Coordinator

January 10, 2001

Objective I

Establish Baseline Data of Current Pest Management Activities

In order to establish baseline data, we chose three Marin County public schools in three different districts: Bacich Elementary School in Kentfield, Miller Creek Middle School in San Rafael, and San Marin High School in Novato. We felt that having information from different districts and three educational levels would broaden our perspective and might reveal important differences.

We have hired three IPM industry experts to conduct the school assessment and have divided the assessment into three parts:

1. Landscape and outdoor nuisance problems: Michael Baefsky, Baefsky and Associates, Orinda, CA
2. Structural, vertebrate, and food service problems: Mike Wolf and Dan Lepez, ipm-BioCare, Novato, CA
3. The human component in pest problems: Phil Boise, Community Environmental Council, Santa Barbara, CA

Michael Baefsky and Dan Lepez both spent a half day inspecting each school. They met with school staff about pest management history, current pest problems, and pest management practices at each site, and then inspected the grounds and buildings.

Phil Boise devised a short questionnaire to survey school staff and spent time interviewing school personnel in person and on the phone to better understand attitudes toward pest management.

The landscape and structural pest management assessments are complete and the assessment of the human component is underway.

Summary of Assessment Results

The main points of the structural and landscaping assessments are listed below:

- **Staff and Budget Deficiencies for School Maintenance.** The most important finding is that building maintenance personnel are well aware of the major pest problems and the conditions in their schools that lead to pest problems, but they often lack the staff and budget to monitor problem areas and to implement preventive measures and long-term solutions. This is not uncommon throughout California, and indeed the United States, and we feel it has grave implications for the future of IPM in schools. The success of an IPM program depends heavily on proper sanitation, habitat modification, and preventive maintenance of both buildings and grounds.
- **Fine Tuning Landscape Pest Management Practices.** Grounds personnel are also aware of the major landscape pest problems, and have devised management strategies to cope with these problems. The most effective role pest management experts can play is to help these schools fine tune management strategies and to suggest alternative long-term solutions to specific problems.

Lack of budget and staff also plays a significant role in limiting the amount and kind of pest management and especially preventive maintenance that can be accomplished by the grounds departments of our three schools.

- **Over-used Playing Fields.** One problem we continually encounter is playing fields that are used 12 hours a day, seven days a week, all year long. Without periods of rest, turf health declines and the fields become highly vulnerable to many different problems.
- **Communication and Coordination.** Improving communication and coordination among departments in the three schools will facilitate long-term pest management planning. Ideally, everyone involved in a school from the school board to the students should be aware of how their policies, decisions, and actions affect pest management. A heightened awareness of the interconnections in a school system can also improve the prospects for long-term pest management solutions. Building design and maintenance, landscape design and maintenance, and occupant use patterns all have an impact on pest problems and their management. For instance, students must be made aware that garbage, especially food waste, thrown outside the garbage can is not only an eyesore, but also an attractant for rats. Groundskeepers should understand that sprinklers positioned so they spray buildings will cause problems that lead to structural pest damage. Administrators need enough information about pest management to understand that planning for renovation or new construction in either buildings or grounds will benefit from review by a pest management expert to minimize designs that lead to pest problems.
- **Monitoring and Record Keeping.** Monitoring and record keeping could be improved at all three schools. Pesticide application records are kept for each school, but the schools do not record pest infestations or any treatments other than pesticide applications. Although some monitoring is occurring at each school, we recommend a higher level of monitoring linked with written records.

Records should be kept on landscape maintenance practices including irrigation, fertilization, aeration, and mowing schedules. Structural pest management records should include observations on the conditions of buildings, inside and out, access points for pests, and conditions that may lead to pest problems. Pest monitoring records showing where pests were sighted and an estimate of the number of pests should also be kept along with records of any chemical *and* non-chemical pest management activities. It is also useful to record human activities that affect pest management positively or negatively.

Monitoring combined with record keeping is important because written records are the memory of an IPM program. They form the basis for making decisions on the most sensible allocation of scarce resources, allow information to be transferred easily and accurately from one employee to another, especially when employees leave the system, and they allow staff to learn more about the nature of various pest problems and which treatments do or do not work. Written records can satisfy public interest in a school's pest control practices and document success stories to share with colleagues and the public.

- **IPM Training.** Training in IPM implementation and techniques is unavailable not only for maintenance and grounds personnel, but also for teachers, students, parents, and administrators.

For groundskeepers and their supervisors, we recommend a series of hands-on workshops addressing the following topics:

1. What is IPM and why should we care?
2. IPM for weeds (focusing on non-chemical control methods)
3. IPM for yellowjackets (this could showcase the successful program at San Marin High)
4. IPM for turfgrass (this could focus on weed management through cultural methods)

For maintenance personnel and their supervisors, we recommend a pair of workshops:

1. How to inspect for structural pest damage and conditions that lead to structural pest problems
2. Least-toxic and non-toxic solutions for structural pests

We recommend that these classes be small, with a ratio of students to instructor of about 12:1. Sessions should run a maximum of two hours and involve the direct and active participation of the attendees as much as possible.

We also recommend IPM training for teachers, administrators and their staff, school board members, parents, and students, but we are still exploring the form these trainings should take.

- **Key Pests.** As expected, the key pests in the three schools are similar to those found, in our experience, in other schools in California and in the country.

Outside, the main problems are weeds, yellowjackets, birds, pocket gophers, and ground squirrels. Each school had areas of standing water next to structures. This problem is caused by improper grading or poorly functioning drainage systems and can lead to serious structural problems with termites and fungal decay.

Inside, Argentine ants are the main pest. Rats and mice were a concern only at one school, but the potential for rodent infestations exists at the other two schools due mainly to un-repaired holes in structures that could provide rodents with access to building interiors. Although school staff did not cite cockroaches as a problem nor did our inspections reveal any evidence of these insects, there is always a potential for cockroach infestations in schools. A similar situation exists for potential infestations of small animals such as opossums, skunks, and raccoons.

- **Pesticides Used.** Few pesticides are being used officially at these schools, and all three schools strongly discourage any unofficial use of pesticides by teachers or staff. Listed below are the pesticides in use by maintenance and grounds personnel:

Microencapsulated diazinon (PT265A[®]) for ants

Microencapsulated diazinon (Knox-Out[®]) for yellowjackets

Diphacinone (Gopher-Getter III[®]) for pocket gophers

Permethrin (Dragnet[®]) for red turpentine beetles on Monterey pines

Herbicides: Roundup[®], Trimec[®], Turflon[®], Mecomec[®], Gallery[®] 75, and Pre-M[®]

It should be noted that microencapsulated diazinon will soon be off the market. Knox-Out is being used at San Marin High for an effective yellowjacket control program. This product is also being used by the East Bay Regional Park District (EBRPD) in their yellowjacket IPM program. We spoke with Nancy Brownfield, IPM Coordinator for EBRPD, to determine if she has found a substitute toxicant. Ms. Brownfield indicated that diazinon is the only material registered for area-wide yellowjacket baiting. EBRPD presently has an Experimental Use Permit for nylar, an insect growth regulator (IGR), but it has not proven completely satisfactory. The U.S. Department of Agriculture in Hawaii is currently experimenting with another IGR for area-wide yellowjacket baiting which shows more promise. We will alert pest management personnel at San Marin High of any new developments.

- **Variables Affecting Pest Management.** The grade level of the school did not make a significant difference in the type of pest problems or in the pest management practices that we found. Although elementary schools may be less likely to have extensive playing fields and high schools may be more likely to have lockers and showers, other factors such as the wealth or poverty of the school district, the interest in safe pest management, and the type of landscaping and construction at the school probably create greater differences in pest problems and their management.

Observations and Unanswered Questions

Training—How to get everyone involved

Teachers and administrative staff are in some ways closest to certain pest problems, yet they have no training in pest management, and may not even be interested in training. They have little extra time and may already feel burdened with meetings. What is the best way to deliver training to this group? Possibilities include laminated fact sheets on topics such as pest prevention, trouble spots in the classroom, non-toxic pest management for common classroom pests.

Another option is short (20 minute) training modules that could fit into staff meetings. Topics could include health effects of pesticides, how to find toxicological information, how to identify pest problems and habitats, and non-chemical pest management methods suitable for implementation in a classroom or office. We should explore the possibility of offering this training for continuing education credit.

Phil Boise suggested we develop “Pest Management Tool Boxes” for specific pests in the classroom. Contents could include a pest management fact sheet along with simple tools. For example, an Ant Management Tool Box might contain a spray bottle with soapy water, plastic containers with snap-on lids for storing food, a tube of caulk, and information on how to set up a “food island” to keep out ants.

School Board members, principals, and superintendents also need information on pest management in order to make sound decisions. Topics for a short training could include information on IPM and the benefits of implementing an IPM program, why building repair is so important, how building design impacts pest management, and fundamentals of turf and weed management. We have not decided on the best way to deliver information to this target group.

Alternative Treatments

Awareness of alternative treatments, either chemical or non-chemical, is low. Personnel may have a certain amount of reluctance to adopt what they perceive as unproven methods or technologies. Initial IPM training can alleviate this issue, but the problem remains of how to keep staff up-to-date. A “new materials and methods” workshop could be offered yearly for continuing education credit, and school districts could be encouraged to subscribe to the Bio-Integral Resource Center’s *IPM Practitioner* and *Common Sense Pest Control Quarterly*. Facilitating communication among school IPM coordinators in the State to share stories of success and failure could help alternatives gain acceptance. Debbie Raphael’s IPM Coordinator Conference in San Francisco at the end of January could be a model for one method of communication. Communication on pest management among the district level managers in a county should also be encouraged. Some districts have information that could be valuable to other districts, but it appears that it is not always shared.

Another issue is that pest problems in a school are complicated by the presence of children. For example, weeds seem to be the main outdoor pest, and one of the best treatments for weeds is mulch. Unfortunately, mulch is not always looked on favorably by groundskeepers. It has many drawbacks including floating into and clogging drains, being attractive to children for kindling fires and for throwing; and mulch can improve the soil enough that more weeds can grow. Written guidelines for using specific alternative treatments in school settings could help the treatments gain wider acceptance.

IPM Implementation

School personnel may balk at IPM implementation because they fear having to learn a whole new system or they worry that IPM won’t work. How can we distill our information down to the most important IPM concepts? What is really necessary to have a successful IPM program? Monitoring is often perceived as too time consuming and therefore is not performed. How can we simplify the process and what kind of monitoring is absolutely necessary? How can we bridge the gap between the ideal IPM program and the reality of small budgets and very limited staff? What kind of expectations can we realistically have for IPM programs in schools, especially schools in poor districts? Should we think about developing management modules for specific pests that may or may not have all the IPM components in them but solve the pest problem?

Initial Assessments

The initial assessment at a school needs to be well-coordinated and carried out in a timely fashion in order not to unduly impose on staff and administrators. It can be a delicate process of eliciting information without putting staff on the defensive. The intrinsic nature of an assessment is judgment, and no matter how

personable and open one tries to be, the people whose work is being assessed may feel on guard or even threatened. Asking for pesticide use records from grounds and maintenance personnel can be seen as a threat and may even move the people whose confidence you are trying to gain into an adversarial position. Pesticide use records can be obtained by asking the County Agriculture Department to secure them.

To aid recall and save time, assessment interviews can be taped. Detailed, oral notes about the site assessment can be recorded to be transcribed later.

Once the assessment is finished, training should be designed to fit the key pests and problem situations discovered in the assessment.

Head Lice

Head lice are a major pest that falls outside the purview of either groundskeepers or maintenance personnel. Non-toxic methods for combating head lice are well documented; however, this problem may require a separate project to adequately inform parents, teachers, and health professionals of these procedures.

Pest Management Summary for Three Marin County Schools

	Anthony Bacich Elementary	Miller Creek Middle	San Marin High
GENERAL SCHOOL INFORMATION			
School Address	25 McAllister Kentfield, 94904	2255 Las Gallinas Ave. San Rafael, 94903	15 San Marin Drive Novato, 94947
School District	Kentfield	Dixie	Novato
Last Day of School, '01-02	June 14, 2002	June 12, 2002	June 13, 2002
Superintendent Phone Number Address Address No. of years in position	Robert Caine 415-925-2230 699 Sir Francis Drake Kentfield, 94904 ~20 years	Dr. Thomas Lohwasser 415-492-3700 380 Nova Albion Way San Rafael, 94903 at least 5 years	Dr. John C. Bernard 415-897-4201 1015 7th St. Novato, 94945 ~2 years
Principal Phone number No. of years in position	Patricia Lynch 415-925-2220	Cookie Morin 415-492-3760 >1 year	Greg Duffey 415-898-2121 ~2 years (principal elsewhere before)
PTA President, '01-'02	Lisa Sandborg	Claire Snyder 415-507-9351	Joannie Wingenbach 415-892-7885
ORGANIZATIONAL STRUCTURE FOR PEST MANAGEMENT			
IPM Coordinator?	Paul Miller, acting	Tim Walsh, acting	Ron Warfield, IPM Program Administrator
Pest management activities carried out at what level?	District staff & outside contractore	District Staff	District Staff
District Supervisor for Maintenance Address Address Phone number Fax number email No. of years in position Licenses held	Paul Miller , Director of Maintenance 699 Sir Francis Drake Kentfield, 94904 415-925-2236 415-925-2238 paulm@marin.k12.ca.us 1 (with district for 19) no licenses, but pesticide safety training	Tim Walsh, Director of Buildings & Grounds 380 Nova Albion Way San Rafael, 94903 415-492-3776 415-492-3781 4 (with district for 24) no licenses (if had to use pesticide in blgs. would call a PCO); 3 district grounds keepers have QAs	Ron Warfield, Manager of Operational Services 819 Olive Novato 94945 415-898-8103 415-898-3134 warfield@nUSD.marin.k12.c a.us 5 (with district for 17) QAC

	Anthony Bacich Elementary	Miller Creek Middle	San Marin High
Other Important District Managers			David Goodwin, District Grounds Foreman 415-898-1266 & David Ashe, District Maintenance and Operations Supervisor 415-892-1596
Main Groundskeeper Phone number No. of years in position Licenses held	Paul Miller 415-925-2236 6 No licenses, but pesticide safety training	Joe Bosche Call Tim Walsh 35 QA	Reed Haslem Call main office 13 No licenses, but pesticide safety training
Total No. of Grounds staff	1 + hire summer help	1 + someone who does a little mowing	1+ extra people for tasks needing special expertise
Head Custodian Phone number No. of years in position Licenses held	Paul Miller 415-925-2236 6 No licenses, but pesticide safety training	Rusty Blanton Call Tim Walsh 8 No license (doesn't use pesticides)	Mark Miller Call school office 1 No licenses, but employee safety training Principal is his site super
Total No. of Custodians	2 (Paul is not one of them)	3 1/2	1-day; 2-night
Outside Contractors Address Address Contact name Phone number	Cagwin & Dorward P.O. Box 1600 Novato, CA Dan Sheehy 415-892-7710	None	No ongoing contractor Have called contractors for pigeon proofing and bee removal in past
Work orders generated by	School sec'ty from custodians or teachers	School sec'ty from custodians or teachers	School sec'ty (Chris Eisenberg) from custodians or teachers
Work orders approved by	Paul Miller	Principal/Tim Walsh	David Ashe (but most are automatically approved)
Pesticide use records stored	with outside contractor (Cagwin & Dorward)	at District office in San Rafael	at District office in Novato and at Co Ag Comm Office
No. of Real Buildings	5	9	10
No. of Portables	4	20	6
Cafeteria/Kitchen? Where do children eat?	kitchen children eat outside and in individual classrooms when raining	kitchen children eat outside and in gym when raining	yes ("Snack Bar") children eat outside or off campus, under patio when raining
Food Prep on Site?	no	yes	occasionally

	Anthony Bacich Elementary	Miller Creek Middle	San Marin High
Food in classrooms?	yes	occasionally	occasionally, but strongly discouraged
Pets in classrooms?	doesn't think so	1 bird, some snakes	no
Lockers in school?	no	yes	yes
Sanitation for lockers?	N/A	Once a year at end of school year	Once a year at end of school year
Dumpster pickup sched.	1 dumpster emptied every other day	2 dumpsters emptied 2 x a week	2 dumpsters emptied every day
Dumpster sanitation?	Once a year	Once a year in summer	Contract says monthly, but doesn't happen
Policy on personal ownership/use of pesticide?	No policy, but discouraged	No policy, but discouraged	No policy, but strongly discouraged—have periodic inspections
No. and size of fields	~48,000 sq ft	1 field, ~1 1/8 A (54,000 sq ft)	Entire site = 40 A Football: 2.13 A Baseball: 2.05 A Sftball/Soccer: 3.14 A Softball: 1.20 A.
No. and size of lawns	none	1 lawn, ~1400 sq ft	43,000 sq ft
Other landscaping of concern		unirrigated grove of Monterey pines	
KEY PESTS			
Insects in and around Structures			
Primary pest	Argentine ants	Argentine ants	Argentine Ants
Pesticide(s) used	None	None	PT265A (microencap. diazinon)
Other control methods	Sanitation	Sanitation	Sanitation
Secondary pest	Yellowjackets	Yellowjackets	Yellowjackets
Pesticide(s) used	None	None	Knox-Out (microencap. diazinon)
Other control methods	Pheromone traps	Sanitation and traps	Sanitation, nest removal
Vertebrates (other than birds)			
Primary pest	None for a couple of yrs.	Pocket gopher	Pocket gopher
Herbicide(s) used		Gopher-Getter III (diphacinone)	None
Other control methods		None	Trapping
Secondary pest	None	None	Ground squirrels
Pesticide(s) used			Strychnine in grain bait
Other control methods			None

	Anthony Bacich Elementary	Miller Creek Middle	San Marin High
Bird pests	Pigeons & seagulls	Pigeons & seagulls	Pigeons & sparrows
Pesticide(s) used	None	None	None
Other control methods	Sanitation	Sanitation	Sanitation, screening, and spike barriers
Other structural pests	None	None	None
Pesticide(s) used			
Other control methods			
Conditions conducive to structural pests	<p>Standing water near structures</p> <p>Openings in structures that need to be screened, filled or repaired</p> <p>Building design that encourages bird roosting/loafing</p> <p>Trees overhanging structures</p>	<p>Standing water near structures</p> <p>Openings in structures that need to be screened, filled or repaired</p> <p>Building design that encourages bird roosting/loafing</p> <p>Sanitation issues in kitchen, exterior lunch area, and dumpsters</p>	<p>Standing water near structures</p> <p>Openings in structures that need to be screened, filled or repaired</p> <p>Building design that encourages bird roosting/loafing</p> <p>Building design that allows rodent burrowing under structures</p>
Turf Pests (other than weeds)			
Primary pest	None	Pocket gopher	Pocket gopher
Pesticide(s) used		Gopher-Getter III (diphacinone)	None
Other control methods		None	Trapping
Secondary pest	None	None	None
Pesticide(s) used			
Other control methods			
Weed Pests			
Primary weed	White clover	Yellow starthistle	Cheeseweed (Fencelines)
Herbicide(s) used	Roundup, Trimec, Turflon, Mecomec, Gallery 75, Pre-M	Roundup	Roundup Pro
Other control methods	None	None	Mulch
Secondary weed	Oxalis	Fenceline weeds	Picris echiodes (Fencelines)
Herbicide(s) used	Roundup	Roundup	Roundup Pro
Other control methods	Mulch	Mowing	Mulch
Tertiary weed	Picris echiodes	None	Wild oats (Fencelines)
Herbicide(s) used	Roundup		Roundup Pro
Other control methods	Mowing		Mulch

	Anthony Bacich Elementary	Miller Creek Middle	San Marin High
Additional weed(s) Herbicide(s) used Other control methods	Many Roundup Mowing	Miscellaneous Roundup	Miscellaneous Roundup Pro
Other landscaping pests Pesticide(s) used Other control methods	None	Red turpentine beetle in Monterey pines Dragnet (Permethrin) None	None

Addendum
to
First Progress Report for Department of Pesticide Regulation Contract No.
99-0251
Model Integrated Pest Management Plan for Schools
Stacy Carlsen, Principal Investigator
Tanya Drlik, Project Coordinator
March 9, 2001

Objective I

Establish Baseline Data of Current Pest Management Activities:

Assessment of Human Component in Pest Management

Assessment Goals

- Obtain general information about perceptions and needs of focus groups
- Assess factors that fall outside of structures and landscape and that deal primarily with personnel and policy
- Identify needs among these groups and in the areas of policies and practices

Assessment Procedure

The primary focus groups interviewed included school board members, administrators, teachers, students, and parents.

The assessment tools used to gather information from these focus groups included a written survey, focus group interviews, and key informant interviews.

Written Survey

A survey was developed with 45 questions covering five primary topics: current pest management policies, organizational structure, control methods, training, and changing pest management practices.

A total of 43 surveys were returned:

Staff (any respondent employed by a school district): 27 total

5 district and site custodians

7 district and site grounds and maintenance

7 teachers

4 principals

1 superintendent

1 "classified"

1 listed as "rsp"

Non-staff (any respondent not employed by a school district): 15 total

13 parents

1 trustee

1 student (high school)

Focus group interviews

These were conducted to gain further insight into the needs and perceptions of the target groups. One meeting was held with the maintenance directors from each of the three target schools, and one meeting was held with sixteen parents.

Key informant interviews

Interviews with the maintenance directors of the three target schools were conducted via telephone.

Conclusions

The highest priorities regarding the needs and perceptions of the target groups could be summarized as communication, information, and risk reduction. The majority of all respondents said they would change their current system in order to reduce the risk associated with pest management. The barriers and incentives associated with this are primarily functions of communication and information.

Observations and Recommendations: Incentives to Change and Barriers to Implementing IPM

Incentives to Change

Without question, the majority of respondents consider “reduction of risk” the most compelling reason to change their current pest management system.

Sixty-three percent of school employees said they would change their system to improve efficiency and oversight. Forty-one percent of school personnel would like to reduce the time spent managing pests.

The community feels that its needs and concerns should be addressed in the operation of the schools, and that meeting these needs and concerns is a compelling reason to change the current pest management system of the school.

Saving money and reducing liability did not rank highly as compelling reasons to change the current system.

Barriers

The non-staff community perceives that the school staff community is unwilling to implement IPM because of feared increases in labor and materials cost, and a compromise to aesthetic standards.

In truth, the highest percentage of school staff (41%) listed “don’t know” as the greatest barrier to implementing IPM. The school staff did indicate that it has discomfort with the lack of “technical information and support,” and with the “efficacy and availability of low-risk materials and practices.”

“Cosmetic compromise” ranked as the number 5 barrier (with 1 being the most important barrier) for school staff. A potential “increase in labor” ranked as number 7, and not a single school employee indicated that an “increase in cost” might be a barrier to implementing IPM.

Recommendations:

“Cost” and “cosmetics” are barriers that may be overcome with training. Training components should include the following:

- A discussion of potential short- and long-term fiscal impacts of IPM, including indirect expenses such as pesticide application posting, notification, and record-keeping.
- For comparison purposes, transition expenses (including training) from conventional pest management to IPM should be applied to the conventional pest management budget. These are costs that are incurred because of conventional pest management practices. Schools with strong and functional IPM programs will not be incurring such expenses.

- A discussion, including a slide show, portraying diverse site management practices with high cosmetic standards. This information may be useful for site managers, grounds employees, and the non-staff community to illustrate the subjective nature of site aesthetics and cosmetic standards.

Observations and Recommendations: Training

The most frequently requested topic of training was “Health effects of pesticides,” a topic which is typically not included in most training components. Training in alternative pest management practices is clearly desired. Most teachers indicated a desire to put out insecticidal bait stations in their own classrooms, but were unwilling to participate in 10 hours of associated training. Non-teachers generally thought that teachers should not be placing insecticidal bait stations.

Recommendations

Teachers should be given some pest prevention tools and training to address immediate pest problems, and to allay the temptation to apply their own pesticides.

Twenty-minute training packages could be developed to present at staff and administrative meetings addressing the following:

- Health effects of pesticides
 - Toxicity classifications (acute and chronic toxicity; carcinogens, reproductive toxicants, endocrine disrupters, neurotoxins), how they are determined, and by whom
 - Inert ingredients
- How to seek out toxicological information
- How to identify pest problems and habitats
- Non-chemical pest management practices that may be implemented in the classroom
- Office/classroom sanitation
- Minor structural improvements
- Evaluating various cosmetic standards and needs
- The subjective nature of a “pest”

Included in the training package could be laminated instructions for identifying and preventing specific pests and monitoring sheets to record observations and management activities.

Teachers and staff need appropriate tools for “first-strike” pest management. Each could be given a “classroom ant tool box” containing a spray bottle with soapy water for wiping up ants, plastic containers with snap-on lids for food storage, masking tape to create “food islands” or food isolation tables (masking

Observations and Recommendations: Training Scheduling

No clear pattern emerged in the desired number or duration of training sessions. Most respondents felt that all stakeholder groups should receive training. No respondents listed “lack of interest on the part of the administration to provide training” as a barrier. Continuing education credits were noted by 30% of the staff respondents as an incentive for training.

Recommendations:

The possibility of offering continuing education credits that would contribute towards a teacher’s accreditation or advancement should be explored. This will provide the incentives to overcome barriers of scheduling and low interest. Training components should be broken into 20-minute blocks, allowing better access to regularly scheduled staff and administrative meetings.

Observations and Recommendations: Budget

A charge of this study was to gather budget figures from each school for all areas connected with pest management. In the focus group interviews and the key informant interviews however, it became clear that this would be extremely difficult. These expenses are not categorized under pest management line items, but instead are represented under pest management, custodial, maintenance, and other expense categories.

These expenses are distributed between district and site budgets and between in-house and contract activities.

Since IPM is in fact an integration of many non-chemical management practices, it would be difficult to extract the labor costs of normal maintenance activities that may have a direct or indirect impact on pest populations. Examples of these would include sanitation, structural repairs, or landscape activities, all of which have an effect on pest populations, but could not be isolated as pest management expenses.

Recommendations

There is a need for an in depth study on the costs of IPM versus conventional pest control.

Observations and Recommendations: Satisfaction with the Current Pest Management System

Satisfaction with the current pest management system shows great room for improvement, with satisfaction among school staff scoring at 2.5, with 1 as excellent and 5 as poor. This, coupled with the high response of staff who see “improving efficiency and oversight” as a compelling reason to change the current system, indicate that the efficiency, decision-making process, and oversight of IPM may appeal to many school staff.

Another interesting point brought to light by the survey is that there is great disparity between the perceived risks of pesticides in the schools.

Recommendations:

Make the training concerning “Health effects of pesticides” available to parents as well as staff to address the disparity in the perception of risk. This may move both sides closer together in their understanding and management of risk, the core of the IPM debate.

Progress Report II

Second Progress Report for Department of Pesticide Regulation Contract No. 99-0251 Model Integrated Pest Management Plan for Schools Stacy Carlsen, Principal Investigator Tanya Drlik, Project Coordinator October 20, 2001

Objective I: Establish Baseline Data of Current Pest Management Activities

The last portion of this objective to be fulfilled is developing an “assessment tool.” After much thought and discussion, we have decided that this tool should be an annotated check list. We have determined that it is unrealistic to expect that school personnel will use this checklist. We have observed that they have little time for informal monitoring, much less a lengthy and more formal assessment. It might be used by a very ambitious and interested IPM coordinator or maintenance director, but it is more likely to be used by consultants or PCOs hired to help a school implement IPM. Parts of the checklist could be used to train grounds keepers or custodians in what to look for when they monitor.

Objective II: Develop a Training Program

Using information from our assessment of the three target schools, we developed a training program that includes all the major audiences in the school system. Custodians and grounds keepers received the most intensive training.

Description of Training Program

Custodians

Mike Wolf and Dan Lapez of ipm-Biocare conducted a three-hour training session for custodians and maintenance directors on July 23, 2001. Fifty-three people attended representing nine (75%) of the 12 major districts in Marin County. The seminar was divided into a lecture and slide presentation followed by a walk around the school site to demonstrate a site inspection. An outline of the training is included as Appendix A.

Evaluations from the class were favorable. Seventy-seven percent of those responding to the question, “What part of the workshop was most useful to you?” answered “both” i.e., the lecture and the guided inspection. The majority (55%) thought the workshop was the right length and 38% thought it was too short. Other comments included “It was very informative.” and “Workshop was excellent.”.

Grounds Keepers

Michael Baefsky or Baefsky & Associates led a series of four two-hour sessions for grounds keepers and maintenance directors on four Fridays from July 20 to August 10, 2001. Fifteen people attended representing seven (58%) of the 12 major districts in Marin County. Four major topics were covered: weed IPM in non-turf areas, turfgrass IPM, IPM for stinging hymenoptera, vertebrate IPM. Each session was

divided into a classroom lecture/demonstration and field exercises. A course outline or the workshop is included as Appendix B.

Comments from the evaluations were very positive: “excellent program, great information, passionate instructor, should be more sessions throughout the year.” We asked about the major obstacles to implementing the concepts and practices presented in the class. The two most important obstacles were lack of time (12 out of 13 respondents or 92%) and lack of staff (6 out of 13 or 46%). We also asked participants if they would be interested in attending a periodic meeting of grounds keepers and supervisors to discuss problems and successes and to have a speaker on a topic of concern to the group. Thirteen out of 14 (93%) said yes, and the most popular frequency for the meeting was quarterly.

Parents

Phil Boise of the Community Environmental Council in Santa Barbara led a discussion with parents on July 17, 2001 and again on October 18, 2001. Thirteen people attended the July 17 meeting and 18 attended on October 18. Although the July meeting was only lightly advertised, the October 18 evening was advertised in all Marin newspapers, flyers were sent to bookstores, health food stores, libraries, and pediatricians’ offices, flyers were sent home in the backpack mail or school newsletters of about 75% of the students in Marin County, and a short article describing the project and highlighting the meeting was published in about 25% of the school newsletters. The poor attendance on both nights suggests several things: 1) advertising the event made little difference in the attendance, 2) parents are extremely busy and must have a very pressing reason to venture out on a school night (or perhaps any night), 3) because of heavy advertising combined with an outreach campaign, parents perceive that someone is taking care of the pesticide problem and it can be relegated to a low priority.

Phil discussed the Healthy Schools Act (HSA), explained the process of IPM, and used examples from his work at Ventura Unified School District to explain the roles played by custodians, grounds keepers, teachers, students, and parents. Parents had time to ask questions and voice their concerns.

Superintendents

In June all Marin County superintendents received a summary of our project, information on training for custodians and grounds personnel, and information on the HSA. In August we sent a reminder about the HSA and requested they file their parent notification letter with the County Department of Agriculture. This allows the Department to monitor initial compliance with the HSA and to offer assistance to districts with questions about provisions in the law. The Department has also offered to make reference materials available to parents who may have questions about materials used in their district.

On October 4, we mailed thank yous or reminder notices to all superintendents. To date we have received 60% of the notification letters. We plan to contact the remaining 40% of the districts by telephone.

Before the end of the year superintendents will receive sample IPM policy language.

Teachers

The Project Coordinator led two-hour training sessions in IPM and the HSA during seminars sponsored by the Aquatic Outreach Institute:

- 09/23/00: 45 teachers from Alameda and Contra Costa Counties
- 10/13/01: 30 teachers from Contra Costa County
- 10/27/01: 20 teachers from Santa Claire County
- 11/03/01: Alameda County Teachers

On October 3, the Project Coordinator gave a 20-minute presentation to the teachers of the Sausalito Marin City School District and covered the HSA, teachers’ role in IPM, classroom cleanliness. This is the first

presentation to teachers we have been able to arrange. It has been quite difficult to get superintendents to allow us to speak to their teachers.

We have given consideration to other ways to reach teachers such as a poster on classroom sanitation for the faculty room, fact sheets on ants, cockroaches, and spiders that could be laminated and kept in the office for reference, and a 10-minute video on classroom cleanliness for showing at staff meetings.

Local School Boards

In June, school board members in each district in the county received a summary of our project, information on training for custodians and grounds personnel, and information on the HSA. Before the end of the year they will receive sample IPM policy language.

County Board of Education

In June the County Board also received the information described above. On July 10, the Agricultural Commissioner spoke at their meeting and publicly recognized contributions from Mary Jane Burke, County Superintendent of Schools, Luke McCann, Assistant County Superintendent, Lila Wilkins, Director of General Services, and Ron Warfield, Manager of Operational Services, Novato Unified School District.

Objective III: Develop an Outreach Program

The goals of the outreach program have been to educate a wide variety of audiences about the HSA, to publicize the Model School IPM project, and to bring and keep IPM and pest management concerns with in purview.

Local School Boards and County Board of Education

All members received letters and information packets.

County Office of Education

Throughout the project we have been in close contact with Mary Jane Burke, County Superintendent; Luke McCann, Assistant County Superintendent; and Lila Wilkins, Director of General Services to seek advice and to keep them informed of our plans and our progress. These three people have also received various letters and information packets.

Superintendents

To date we have sent them four letters with information packets and we have periodic personal contact with the superintendents of the target school districts.

Teachers

Teachers were targeted as another audience for the parent information night led by Phil Boise.

09/20/01: Articles on ants in the classroom, the HSA, and our project were sent to every principal in the County with a letter from Mary Jane Burke asking that they be included in the PTA or school newsletters.

10/15/01: "School Garden News" from the Marin County Stormwater Pollution Prevention Program (MCSTOPPP) was sent to about 500 teachers. The newsletter featured our articles on ants in the classroom, the HSA, and the summary of our project. The news letter was distributed to 25 more teachers in a gardening workshop sponsored by MCSTOPPP.

Fall '01: An article on the HSA was submitted to *The California Educator*, the monthly journal of the California Teachers' Association.

Groundskeepers, Custodians, Maintenance Directors, and IPM Coordinators

These groups have received letters and information packets, and we have attended several of their meetings to make presentations. We also have periodic phone and personal contact, and we are scheduling visits to their schools to learn more about their work and their problems.

Parents

09/20/01: Articles on ants in the classroom, the HSA, and our project included in PTA or school newsletters

09/25/01: Article on HSA sent to *Bay Area Parent*

09/26/01: Article on HSA, IPM, and our project sent to *Parents Press*

Pest Control Operators (PCOs) and School Maintenance Staff

Presentations were made by the Project Manager on the HSA and the Marin school IPM project at "Putting IPM into Practice" Seminars sponsored by the Bio-Integral Resource Center.

6/28/01: Walnut Creek

7/9/01: Cupertino

7/17/01: Hayward

Attendance breakdown:

Public agency staff: 80

School staff 22

PCOs 10

Pest Control Advisors

On 11/15/01 the Project Manager will make a presentation at a PAPA (Professional Association of Pesticide Applicators) Seminar in Chico entitled "Strategies for Implementing a Successful IPM Program in Schools"

General Public, Parents, and School Staff

These groups are targeted with newspaper articles and information on the County website.

Newspaper Articles

SF Chronicle, 2/2/01 (Kelly St. John)

Marin Independent Journal, 7/9/01 (Mark Prado)

Novato Advance, 7/11 through 17, 2001 (Mary Connell)

Marin Independent Journal, 7/19/01 (Mark Prado)

Marin Independent Journal, 10/5/01 (Jane Fatcher)

In November the new Marin County website to be unveiled. We will post information on the following:

Healthy Schools Act

Marin Model School IPM project

Fact sheets for custodians and groundskeepers on ants, roaches, spiders, and rats & mice

Fact sheet for teachers and parents on ants, roaches, and classroom cleanliness

DPR Progress Reports for our project

Links to resources for school IPM

Peer Recognition Program

- Professional recognition for school maintenance directors and groundskeepers was provided through DPR continuing education credits for those with licenses.
- Certificates of completion were issued to each participant in the Landscape IPM Workshop and distributed by the Agricultural Commissioner at their last class.
- Ron Warfield, Manager of Operational Services, Novato Unified School District received an IPM Innovator Award from DPR, 10/3/01.

Objective IV: Coordinate Demonstration Projects

On July 18, 2001 an IPM Exposition was held at San Marin High School to showcase companies that provide IPM products and services and to provide a networking opportunity for people involved in school IPM. Opening remarks were given by Paul Heliker, DPR, Stacy Carlsen, Marin County Agricultural Commissioner, Cynthia, Marin County Supervisor, Dr. John C. Bernard, Superintendent, Novato Unified School District. Nita Davidson, of DPR's School IPM Program, gave the closing talk on the Healthy Schools Act.

Twenty-six exhibitors participated including manufacturers, PCOs, consultants, non-profits, and public agencies. Over 275 people from around the state attended representing school districts, County Departments of Agriculture, universities, PCOs, consultants, non-profits, public agencies, and city and state government.

For the first Expo of its kind, the response and support were remarkable.

Appendix A

Structural IPM Training Outline for Custodians and Maintenance Directors

Note: For text see Final Report Appendix D.

Landscape IPM Training Outline for Grounds Keepers and Maintenance Directors

Note: For text see Final Report Appendix F.