

Pest Management Alliance Project Final Report

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Model Integrated Pest Management Plan for Schools

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**Marin County Department of Agriculture/Weights &
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, groundskeepers, 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 understaffed 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 groundskeepers 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 Heliker, 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 telephones 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 slobs." 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 felt 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)

