Residential Pesticide Use in California:

A Report of Surveys taken in the Sacramento (Arcade Creek), Stockton (Five-Mile Slough) and San Francisco Bay Areas with Comparisons to the San Diego Creek Watershed of Orange County, California

Prepared for the California Department of Pesticide Regulation

Mary Louise Flint, Ph.D
Director, IPM Education and Publications and Extension Entomologist
University of California Statewide IPM Program
University of California Davis

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Preface

This project was funded by a contract (DPR 01-0219C) with the Department of Pesticide Regulation (DPR) of the California Environmental Protection Agency. The contract was supported by an allotment dedicated to the development of data that California Regional Water Quality Control Boards (Regional Boards) will use during the development and implementation of the total maximum daily loads (TMDL) for pesticides in California's waterways. A TMDL is a quantitative assessment of water quality problems, contributing sources and load reductions or control actions needed to restore and protect bodies of water. The contract addressed an issue that the Regional Boards and DPR agree is key to understanding sources of pesticides in urban waterways, namely consumer behavior.

The statements and conclusions in this report are those of the authors and not necessarily those of DPR. The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as actual or implied endorsements of such products.

Acknowledgments

Principal Investigator and Primary Author: Mary Louise Flint, Director, IPM Education & Publications, University of California Statewide IPM Program, UC Davis. For information about this report or electronic copies, contact Dr. Flint at mlflint@ucdavis.edu.

Cooperators:
This project built on a previous project led by Cheryl Wilen, Area IPM Advisor, UC Statewide IPM Program, UC Cooperative Extension San Diego County, that surveyed residents in Orange County in 2000 under DPR contract 99-0268. Dr. Wilen was a cooperator on this project.

Phone surveys were carried out by the Social Science Research Center, CSU Fullerton, Greg Robinson, Director; Shelly Osborn, Project Manager.

Christine Joshel of the Office of Pesticide Information, Department of Environmental Toxicology, University of California, Davis assisted in the shelf survey.

Advisory Committee
The following people were members of an advisory committee that guided survey development and analysis. Their contributions were substantial:

Gene Davis
Central Valley Regional Water Quality
Control Board, Region 5-Sacramento

Mary Louse Flint
IPM Education & Publications
UC Statewide IPM Program
Davis, CA

Bill Johnson
Regional Water Quality Control Board
San Francisco Bay Region
Oakland, CA

Greg Robinson
Social Science Research Center
CSU Fullerton

Kathy Russick
Russick Environmental Consulting
Elk Grove, CA

Nan Singhasemanon
CA Department of Pesticide Regulation
Environmental Monitoring Branch
Sacramento, CA

Christy Spector
Central Valley Regional Water Quality
Control Board, Region 5-Sacramento

Cheryl Wilen
Area IPM Advisor
UC Statewide IPM Program
UCCE San Diego

Abstract

The University of California Statewide IPM Program sponsored a telephone survey and a shelf survey of pesticide products to gather information about outdoor pesticide use, pest control practices and attitudes of residents living in the Arcade Creek/Sacramento, Five Mile Slough/Stockton and San Francisco Bay areas in 2002-2003. These results were compared with an earlier southern California survey to determine applicability to other areas of California. For the most part, attitudes, practices, and pests were similar in all four areas. Orange County residents tended to have slightly more pest problems and greater pesticide use than residents in the three northern California areas. Somewhat more Bay Area residents reported no outdoor use of pesticides than those in other areas, but these differences may not be significant.

In all areas, ants were by far the most common pest treated either by residents or by professionals hired to do the job. Snails and slugs and spiders are other common pests. Most treatments are do-it-yourself. Over half of respondents reported that outdoor areas surrounding their homes had been treated by themselves or another resident in the last 6 months. About half the products used were ready-to-use products requiring no mixing or dilution and 60% were applied to hard surfaces such as sidewalks and home exteriors or foundations. While most users say they read labels, 40-60% don't follow directions precisely when mixing and measuring. Large home supply stores such as Home Depot accounted for 42-55% of purchases in all areas. Only a minority of residents hire pest control professionals for outdoor pest problems—about 11-17% of single family homeowners in northern California. However, over 80% of these people would be interested in hiring environmentally friendly pest control companies to do this work.

Well over half of the respondents in northern California areas were aware that pesticides used around homes and gardens affect water quality in local creeks, rivers and bays. However, only about a quarter of them had made changes in their pest control practices as a result. Most common changes were cutting back on the use of pesticides and changes in application and disposal habits. A surprising finding was that awareness of water quality problems did not always lead to more environmentally sound practices. Almost half of respondents in the three northern California watersheds disposed of pesticides improperly. Many were throwing pesticide containers containing pesticides in the trash, but 5 to 15% in each area admitted to pouring mixed pesticides into inside or outside drains or the street gutter.

Twenty-eight retail stores were sampled for pesticide products and ability to help answer pest control questions. We found 542 different products containing 112 active ingredients. This great variety of ingredients--offered under a mind-boggling number of different brand names and formulations--illustrates how difficult it is for a typical consumer to make informed choices when selecting pesticides. Unregistered pesticides were found in several surveyed stores.

Education and policy initiatives that could reduce water quality problems associated with residential pesticide use were recommended. Top priorities should be pesticide disposal education and improved accessibility of hazardous waste sites. Educational programs on hazards and alternatives for retail employees and information at point of purchase are also likely to have payoffs. The University of California has information on alternative practices that can be more widely distributed through these outlets and county UCCE programs. A certification program or guidelines for selecting environmentally friendly pest control companies is recommended to assist consumers. Other recommendations relate to selling pesticides in smaller quantities, providing more prominent and helpful information on pesticide disposal, active ingredients and risks on labels, a consumer database of health and environmental risks, and a requirement that all stores report pesticide sales monthly.

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Residential Pesticide Use in California:

A Report of Surveys taken in the Sacramento (Arcade Creek), Stockton (Five-Mile Slough) and San Francisco Bay Areas with Comparisons to the San Diego Creek Watershed of Orange County, California.

Chapter 1: Introduction, Summary, and Recommendations

The University of California Statewide IPM Program, at the request of the California Department of Pesticide Regulation, sponsored a telephone survey to garner information about outdoor pesticide use and pest control attitudes of residents living in the Arcade Creek (Sacramento), Five-Mile Slough (Stockton), and San Francisco Bay Area water sheds. The survey built on an earlier one conducted in 2000 the San Diego Creek Watershed in Orange County under the direction of Dr. Cheryl Wilen of the UC IPM Program in southern California. Telephone surveys were carried out by the Social Science Research Center at California State University Fullerton. Major goals of these surveys were to

- Identify pests perceived to be the most problematic in various parts of California
- Find out how residents obtain pest management information and select the pesticides they use
- Learn where and how residents apply pesticides
- Investigate ways to better target education and outreach efforts
- Determine the factors affecting decisions to hire professional pest control operators
- Investigate ways to better target education and outreach efforts
- Establish a baseline for evaluation of future education and outreach programs
- Determine the relevance of the information gained in the Orange County survey for other parts of California.

Chapter 2 of this report includes a regional summary of survey findings and details on methodology. Chapters 3, 4 and 5 give complete survey results for each of the three northern California surveys. Survey questionnaires are included in Appendices A and B.

We also conducted a shelf survey of representative stores in the Sacramento and San Francisco Bay areas to determine the variety and range of home and garden pesticide use products available to residents in these areas.

Recommendations for education and policy initiatives are included at the end of this chapter.

Telephone Surveys

Between September 2002 and January 2003, we surveyed approximately 2600 households in three northern California watersheds to assess pesticide application and disposal practices, major

pest problems, awareness of water quality issues, and other factors related to pesticide use in outdoor areas around homes. Surveys included residents of the Arcade Creek watershed in Sacramento, the Five Mile Slough watershed in Stockton, and the San Francisco Bay Areas. Where possible, these results were compared to results obtained in a similar survey of residents of San Diego Creek and East Costa Mesa/Newport Beach watershed area in Orange County carried out in 2000**.**

Highlights

For the most part, attitudes, practices, and pests were remarkably similar in all four areas. The Orange County residents tended to have slightly more pest problems and greater pesticide use than residents in the three northern California areas. This may reflect the longer growing season in southern California as well as the fact that the southern California surveys were taken in late summer (August 29-October 3) when garden problems are still ongoing versus the later fall and early winter timing (September-January) of the northern California surveys. The only notable difference between the three northern California areas was that somewhat more Bay Area residents reported no outdoor use of pesticides around their homes that those in the Sacramento Arcade Creek and Stockton/Five Mile Slough watersheds, although statistical analyses were not made to determine significance between areas on this variable.

In all areas, ants were by far the most common pest treated by residents themselves or by professionals hired to do the job. The majority of residents had either applied a pesticide themselves or by another family member in the last 6 months (51 to 60% of respondents in northern California and about 78% of those in Orange County). About half the products used by residents were ready-to-use products requiring no mixing or dilution and 60% were applied to hard surfaces such as sidewalks and home exteriors or foundations. Large home supply stores such as Home Depot accounted for 42-55% of sales in all areas.

Only a minority of residents hire pest control professionals to manage outdoor problems—about 11-17% of single family home owners in northern California. However, over 80% of these people would be interested in hiring environmentally friendly pest control companies to do this work and many would be willing to pay more to protect the environment.

Almost half of respondents in the three northern California watersheds disposed of pesticides improperly. Many of these people were throwing pesticide containers containing pesticides in the trash, but 5 to 15% in each area admitted to pouring mixed pesticides into inside or outside drains or the street gutter. Sacramento/Arcade Creek area was unique in that no one reported pouring left-over mixed up pesticides down outside drains or in street gutters.

Although a majority of people stated that they follow label directions precisely, substantial numbers (44-62% in all areas) “estimate” rather than follow label directions when measuring and mixing pesticides.

Well over half of the respondents in northern California areas were aware that pesticides used around homes and gardens affect water quality in local creeks, rivers and bays. (This question was not asked in Orange County.) Only about a quarter of the residents stated that they had made changes in their pest control practices as a result. Most common changes were cutting back on

the use of pesticides and changes in application and disposal habits. A surprising finding was that awareness of water quality problems did not always lead to more environmentally sound practices. For instance, respondents in the Bay Area and Arcade Creek areas who were aware of water quality problems associated with home a garden use of pesticides were no more likely to dispose of pesticides properly than those who were not aware of problems.

- **Major Pests.** Insects were considered by far the greatest outdoor pest problem in all northern California areas, although fewer Bay Area residents (36.9%) considered them problems than in the Sacramento-Stockton area (45.4 and 48% respectively). Snails and slugs ranked second in Stockton/Five Mile Slough and Sacramento/Arcade Creek, whereas vertebrate pests ranked second in the Bay Area and slugs and snails third—although similar percentages listed these mollusks as a problem in all areas (24.4-29.4%). Vertebrates were also considered a problem by over 25% of Sacramento/Arcade Creek residents. Fewer than 9% of respondents in any northern California area considered plant diseases a major problem, whereas weeds were considered a major problem by 14 to 20% of respondents.

  Overall, Orange County/San Diego Creek residents seemed to have more problems with pests than those in northern California. Insects were also the most frequently listed pest in Orange County with 65.3% of respondents listing them as a major concern. Over forty percent of respondents listed snails and slugs as a major problem—a substantially larger percentage than in the northern California surveys. Plant diseases were listed by over 20% of the Orange County respondents as a major pest, making these problems more than twice as prevalent as in northern California. However, there is some evidence that respondents were misidentifying damage caused by small insects such as the giant whitefly as plant diseases. Weeds and vertebrate animal pests were listed at about the same frequency as in the Bay Area.

- **Pest identification:** About 10-13% of people in each northern California area said they did not know what pest problems they have and haven't sought to find out. In all areas, residents tended most often (82-85%) to rely on their own experience to identify pest problems. When assistance is sought, 6 to 8.4% look to books, internet or magazines. Similar numbers (5.8-7.8%) go to store personnel for help in identifying pest problems. Many people used more than one information source.

  In the Orange County survey, results were similar although somewhat more (12%) relied on store personnel for help in identifying pests.

- **No pesticide use.** More respondents in the Bay area (40.6%) reported no outdoor use of pesticides than in any other area—24.7% of respondents in Sacramento/Arcade Creek, 22.3% in Orange County and 19.3% in Stockton/Five Mile Slough reported no outdoor use at their homes.

- **Contracting for outdoor pest control.** Only a small portion of respondents stated that they personally hire a pest control company or professional to do outdoor pest control: 11.1% in the Orange County/San Diego Creek watershed area, 10.1% in Stockton/Five Mile Slough area, 6.7% in the Sacramento/Arcade Creek water shed and 6.5% in the San Francisco Bay

Area. However, a higher proportion reported that a professional or other person paid by a landlord or homeowners' association was hired to do pest control around their residence. Use of pest control professionals varied considerably by resident type and home ownership. As might be expected, those who owned a detached single family home were more likely to hire a pest control professional themselves (11 to 17% among the areas) than renters or condominium owners. Convenience, expertise and seriousness of the pest problem were the most frequent reasons people gave for hiring professionals. The top reason people gave for not hiring professionals was that pest problems were not serious enough; cost and personal expertise were also factors.

The top three pests that Sacramento/Arcade Creek and Stockton/Five Mile Slough respondents used professional help to control were ants, spiders and termites. In the Bay Area, ants, snails or slugs and rates or mice were the top pests. However, in all cases, ants were by far the most common target. (Orange County residents were not asked this question.)

- **Pesticide Use.** Persons who stated that they or another member of their household applied outdoor pesticides at their residence were asked about pesticide use. About 51-60% of respondents in northern California reported using a pesticide in the last 6 months. Many people (17-22%) could not recall what products they used. Those who could recall often only recalled a general brand name such as "Raid" which could have contained one of many active ingredients. By far the greatest number of products purchased (40-47.5%) was for ant control. More than half the products used in each area were ready-to-use products either ready-to-use sprays (aerosols or squirt bottles) or enclosed. Ants were the most common target of self-applied pesticides in all areas. Snails and slugs were the second most common target of self-applied products in the Bay area and Sacramento/Arcade Creek area; spiders ranked second in the Stockton/Five Mile Slough watershed.

  More than 78% of Orange County respondents reported that they used a pesticide in the last 6 months; about half these products were ready-to-use formulations. Ants, followed by snails, were also the most frequent target of pesticide applications.

- **Where pesticides applied.** About 60% of the pesticides were applied to hard surfaces such as sidewalks, walls or structure foundations in all areas. Equal percentages (about 20% each) of the products were applied to lawns and/or ornamental plantings. Less than 11% of products were applied to vegetable gardens, fruit trees or other edible plants. This question was not asked in Orange County.

- **Where pesticides purchased.** Large home supply stores such as Home Depot accounted for 42 to 52% of all pesticide sales to residential users in northern California. Hardware stores were the second most important source in the Bay area and the Stockton/Five Mile Slough area, whereas grocery and drug stores were the second most important source in the Sacramento Arcade creek area. Retail nurseries accounted for less than 10% of sales in all areas.

An even higher percent of the Orange county respondents relied on large home supply stores for pesticide purchases (55.1%) with grocery/drug stores second, accounting for about 18% of purchases. Nurseries accounted for 8.1% of purchases.

- **Frequency of Use**. The largest share (between 43 and 47.5% in all northern California areas) of the respondents who had applied pesticides in the past 6 months stated that they normally applied pesticides between 1 and 3 times a year. However, about a third of respondents applied pesticides more than 3 times a year with about 7% of the Sacramento/Stockton respondents and 3.4% of the Bay Area respondents applying pesticides more than 12 times a year.

  Orange County respondents applied pesticides a bit more frequently with 54.6% applying pesticides four or more times a year and 13.9% applying more than 12 times a year.

- **Reading of Labels.** Although the majority of respondents (63.6% in the Sacramento/Arcade area, 67.1% in the Bay Area and 75% in the Stockton/Five Mile Slough Area) stated that they read and followed all label directions when deciding how much pesticide to use, more than 12% admitted that they don't read label directions. Only about half of the respondents properly measure pesticides, while 52.4% in the Bay Area, 48% in the Sacramento/Arcade area and 43.8% in the Stockton area just estimate the approximate amount to mix or apply.

  Similarly, 61.9% of Orange county respondents stated that they read and followed all directions on the label, yet 61.5% stated that they estimate rather than measure pesticide when they make an application.

- **Disposal of mixed pesticides.** Many respondents disposed of unused portions of mixed pesticides improperly. More than 22% of Bay Area respondents threw unused pesticides in the trash and significant portions poured them down the drain (8.6% inside, 4.3% outside) or gutter or street (5.7%). In the Stockton/Five Mile Slough area, 12.5% put them in the trash, 5% poured them in the street or gutter, 10% poured in toilet or inside drain and 7.5% in the outside drain. Sacramento/Arcade Creek fared a little better with 10% putting them in the trash and 5% pouring them in the toilet or inside drain. (No Arcade Creek respondents poured them in the gutter or outside drain). Some people used more than one disposal method. The only acceptable way to get rid of mixed up pesticides is to apply them to plants listed on the label at the label rate or take them to a hazardous waste dump.

  In Orange County, 8% stated that they put unused mixed pesticide in the trash, 3.4% poured it down an inside drain or toilet, and 1.1% poured in street, gutter or in outside drain.

- **Disposal of unused pesticides.** About half of respondents in all areas admitted to disposing of unused pesticides in the trash, which is illegal. Only a small percentage poured unused pesticides straight from the bottle into the drain. About a quarter take unused products to hazardous waste disposal sites and about 9 to 12% in each area simply use products up according to the label, which is another appropriate disposal method.

- **Choosing pesticide products.** The two top reasons for choosing specific pesticide products in all areas were how fast the product worked and health and human safety. However in the Bay Area, how fast it works was a factor in more people's choice (40.4% versus 32.3% for human health concerns) while in the Stockton/Five Mile Slough area health and human safety was an important factor to more people (41.6% versus 27.3% for how fast it works). In the Arcade Creek/Sacramento area both factors weighed in about the same at 32.2% for how fast it works and and 31.4% for health and human safety. Cost, pet safety and how long it lasts were all important factors in all three areas. Environmental concerns were a factor for 10 (Sacramento and Stockton) to 16% (Bay Area) of respondents.

  This question was read differently in the Orange County surveys, so results are not comparable.

- **Sources of information affecting choice of product.** In all 3 areas the top 4 sources of information used when choosing a pesticide product were "word of mouth", product labels, store employees and advertisements. Word-of-mouth was the top source in all areas. Store employees were second in the Bay Area, whereas product labels were the second ranked source in Sacramento and Stockton. Store employees were a greater factor in choice among people who purchased pesticides in hardware stores or nurseries than those who purchased in discount department stores.

- **Products Stored at home.** About 80% of the northern California respondents who self-apply pesticides had from 1 to 3 products stored in their homes with between 11 to 14% having no products and between 3.6 and 6.6% having 6 or more products. The majority of respondents said products stored in their homes were less than one year old (59.8% in Sacramento/Arcade, 67% in Stockton/Five Mile Slough and 56.9% in the Bay Area). However, a percentage in each area (from 5.4-9.6%) had products older than five years. People who had the most number of products in were more likely to store products for a longer time. This question was asked differently in the Orange County/San Diego Creek survey, but almost 95% of respondents in that survey who had pesticides stored in their homes had at least one product that was one year old or older.

- **Potential use of environmentally friendly pest control companies.** More than a third of respondents in each northern California area said they were somewhat likely or very likely to hire an environmentally friendly pest control company or professional. Of those who currently hire pest control professionals, these numbers are substantially higher. Between 81 and 83%% said they were somewhat likely or very likely to hire an environmentally friendly pest control company if one were available. Many stated that cost would not influence this decision (49% in the Stockton/Five Mile Slough area, 41% in Bay Area, and 34% in Sacramento/Arcade Creek area). About half of those likely to hire environmentally friendly professionals were willing to put up with slower pest control and more than half stated that need for repeat visits wouldn't affect their decision. This question was not asked in the Orange County surveys.

- **Awareness of water quality problems associated with pesticide use.** Well over half of the respondents in all areas were aware that pesticides used around homes and gardens affect

water quality in local creeks, rivers and bays. About 40% of Bay Area and Stockton/Five Mile Slough residents and 45% of Sacramento/Arcade Creek residents recalled hearing about water quality problems resulting from pesticide use in the last year. A significant portion (28% in the Bay Area, 25% in the Sacramento/Arcade Creek area and 18.9% in the Stockton/Five Mile Slough area) said they had done something in response to this information. The most common changes were cutting back on the use of pesticides and changes in application and disposal habits. These questions were not asked in the Orange County surveys.

A surprising finding was that awareness of water quality problems did not always lead to more environmentally sound practices. Respondents in the Bay Area and Arcade Creek areas who were aware of water quality problems associated with home a garden use of pesticides were no more likely to dispose of pesticides properly than those who were aware of problems. On the other hand, Five Mile Slough respondents who disposed of pesticides properly were much more likely to be aware that pesticides affect the water quality in local creeks, rivers and bays than those who didn't. Part of this discrepancy may be accounted by the fact that much of the improper disposal was into trash cans rather than gutters and drains.

Shelf Survey

As part of this study, we conducted a shelf survey of pesticide products on sample store shelves in Sacramento County and the Bay Area (Contra Costa County) between February 15 and March 7. In each area we sampled 14 stores of the following types: 2 large home supply stores (Home Depot, Lowe's), 3 grocery/drug stores, 3 discount department stores (WallMart, Target, KMart), 3 hardware stores, and 4 retail nurseries. Although we know that the largest share of products is purchased at home supply stores, we wanted to investigate the store-type differences

For each store, we recorded every pesticide product on the shelf, including product name, active ingredient, formulation and active ingredient. We found 542 different products containing 112 different active ingredients. We did not include products applied to pets or insect repellents applied to people, although indoor pest control products such as those used for cockroach or flea control were included. This great variety of ingredients offered under a mind-boggling number of different brand names and formulations illustrates how difficult it is for a typical consumer to make informed choices in selecting pesticide products.

The greatest number of products tended to be found at hardware stores, which featured products for indoor as well as outdoor use. Large home supply stores also had a large number of selections. Discount department stores tended to have the least variety of products. Grocery and drug stores also had a limited number of products but tended to focus on indoor pests. Nurseries primarily carried pesticides for outdoor pest problems, so had fewer than hardware stores but often featured the greatest variety of garden products, including the best selection of least toxics.

Certain active ingredients were very dominant in the market. We found 78 different products containing the insecticide permethrin, by far the most common active ingredient. Another pyrethroid used primarily for indoor pests, talomethrin, was found in 32 products. The molluscide metaldehyde was found on shelves in 30 different products. Other common active

ingredients were the herbicide dicamba (28 products), the insecticide pyrethrin (26 products), and the herbicide glyphosate (25 products). In contrast, diazinon, the popular pesticide that used to dominate the market but is being phased out, was found in only 13 products on store shelves.

We also made notes about amount of shelf space devoted to pest control products, availability of information on safer alternatives, and helpfulness and knowledge of staff, and display of unregistered products such as chlorpyrifos and rotenone. Many stores had products that are no longer registered for home and garden use on display.

A full summary of the shelf survey data will be available in April 2003.

Policy And Outreach Initiatives Which Could Reduce Water Quality Problems Associated With Residential Pesticide Use

- California residents still need to learn more about proper disposal of pesticides. Almost half the people surveyed were disposing of pesticides improperly—either in the trash or down the drain. Surprisingly, respondents who were aware of water quality problems associated with pesticides were just as likely to improperly dispose of pesticides in the Bay Area and the Sacramento/Arcade Creek area as those who didn't.

- Other regions may want to study Sacramento's outreach program for educating the public about keeping pesticides and other toxics out of street gutters and drains. No Sacramento/Arcade Creek respondents reported disposing mixed pesticides down outside drains and gutters as opposed to 10% of Bay Area respondents and 12.5% of Stockton/Five Mile Slough respondents who used pesticides that had to be diluted and mixed.

- Many Californians are not aware that throwing containers of unused pesticides in the trash is an illegal and unacceptable way to dispose of pesticides. This confusion is not helped by the unclear disposal directions on many pesticide labels. In fact, in the Stockton/Five Mile Slough and Sacramento/Arcade Creek areas, we found people who read the label carefully were more likely to dispose of pesticides in the trash. Pesticides thrown in the trash are less likely to end up in rivers, creeks and bays than those dumped down drains, but still present problems for worker health and the environment. Home and garden pesticide labels should be reconfigured to include better information about disposal.

- Hazardous waste sites that can take unused pesticide products need to become more accessible and well-known. Only about a quarter of residents who use pesticides have ever taken unused products to a hazardous waste dump. This contrasts with over 50% who report disposing them improperly in the trash or down the drain. Often there is only one hazardous waste dump that accepts pesticides in a county and it is often difficult to find their locations. Frequently these dumps accept materials only one or a few days a week. Residents would be more likely to dispose of pesticides properly if there were annual pick-ups of pesticides or more local disposal sites. Requiring stores to give out handouts with locations and hours of hazardous waste stations with every pesticide sale would help publicize their location.

- Ant control accounts for the greatest amount of pesticides applied in residential areas. Many ant control products are applied to impervious surfaces such as sidewalks, driveways and around building foundations, making them more subject to run-off into gutters and storm drains than materials applied to lawns or plants. Educational activities directed at educating people about alternative ant management practices is likely to reap great rewards in improved water quality.

- Over 80% of residents who hire pest control professionals to manage pests outside their homes say they would be likely to hire environmentally friendly companies to do this work. However, at present there is no way for consumers to identify companies that may be using methods that are less risky to the environment. A certification program or consumer guidelines for selecting such companies would be useful.

- Retail store employees were one of the most important sources of information consumers use when selecting pesticides. More than a quarter of Bay Area residents, for instance, relied on store employees' advice. "Word of mouth" and pesticide labels are other important sources—but these are difficult to manage. Better education of store employees about environmentally sound pest management practices and more free information in stores in the form of posters or tear sheets on ways to manage pests without risking water quality would be beneficial. Although we found some retail store employees well informed about pesticides, many others knew little about products and were not able to assist customers in finding less toxic products.

- Pesticides should be sold in smaller quantities to discourage storage of large amounts of pesticides or improper disposal of excess pesticide and decrease the tendency to over apply the product. Most home and garden pest control problems only require a spot treatment on one plant or in a small area, it is often impossible to find a container of product that is appropriate for the job. Ready-to-use pesticides are often the best choice.

- Pesticide labels need to more prominently display active ingredients and potential environmental problems. Few consumers know what active ingredients they are purchasing or their risks. Many very similarly named products contain quite different active ingredients and it is difficult for consumers to distinguish them.

- Consumers would benefit from a database of home and garden use products with registration status and information on potential health and environmental impact. While there are good label databases for agricultural products, it is very difficult for home and garden pesticide users to find reliable information. With more than a hundred active ingredients and more than 500 products on northern California retail shelves, better information is required.

- The California Department of Pesticide Regulation should do a better job of checking retail shelves for unregistered pesticides. We found pesticides that are no longer registered on shelves of many of the stores we surveyed.

- The California Department of Pesticide Regulation should require stores to make a monthly report of pesticides sold. This could be done through the bar code. While agricultural

pesticide use must be reported by law, there is no record of home and garden pesticide sales or use in the state.

- California residents should be encouraged to use alternatives to pesticides. Many pests including the two top targets of pesticides--ants and snails and slugs--can be managed without the use of pesticide sprays in some situations. Another common target of pesticide sprays identified in this survey—spiders—should rarely be treated with insecticides. The University of California maintains a database of pest management options for home and garden at http://www.ipm.ucdavis.edu that includes many reduced risk options. The University of California, through its Statewide IPM Program, its county Cooperative Extension offices and Master Gardener programs should be supported in its efforts to get this information out to consumers and retail personnel.

- Although the message that urban use of pesticides is affecting water quality has gotten out to a substantial portion of the public, similar efforts must be made to get people to change specific behaviors like disposal practices or product choices to reduce problems. Only about a quarter or a fifth of those who had become aware of water quality problems could identify a specific action they had taken to reduce the problem.

- Educational programs in future years will have to change to adjust to new products and problems. Much of the water quality outreach over the last few years has been directed at getting people to reduce the use of the organophosphate insecticides that have been detected at the greatest levels in California creeks, rivers and bays. Now many of these products are being phased out, we will be seeing a big increase in new types of products and potential problems.

- To determine effectiveness of education and outreach programs over the next 5 years, it is recommended that a follow-up survey be carried out in 2008.

Chapter 2: Summary of Regional Findings

INTRODUCTION

Between September 2002 and January 2003, approximately 2600 surveys were conducted with residents in randomly selected households in the Arcade Creek watershed in Sacramento, the Five Mile Slough watershed in Stockton, and in the San Francisco Bay area. Previously (in 2000), 1,424 residents in the San Diego Creek and East Costa Mesa/ Newport Beach Watershed areas in Orange County were surveyed. This chapter presents comparisons, where applicable, between survey results in these four California watersheds.[1] Note that these are "side-by-side" comparisons and do not denote statistically significant differences between regions. Chapters 3, 4 and 5 present more detailed survey results for each of the three watersheds.

METHOD

Development of the Survey Instrument

The survey questionnaire used in the 2000 Orange County was developed by Cheryl Wilen, Area IPM Advisor, UC Statewide IPM Program in consultation with various pest management experts and survey specialists at the Social Science Research Center at California State University, Fullerton. For the 2002-03 northern California surveys, this survey was reviewed and revised under the direction of Mary Louise Flint based on input from representatives of the California Department of Pesticide Regulation, the San Francisco Bay Area and the Central Valley Regional Water Quality Control Board who served as a technical advisory committee. Questions were added to further elucidate understanding of water quality issues, disposal practices, issues related to hiring pest control firms and willingness to hire professionals who implement more environmentally sound practices. Copies of the survey questions are included at the end of each regional report. Questions were the same in all areas, except a question asking about Western Nile Virus asked in the Arcade Creek and Five Mile Slough areas was not asked in the Bay Area.

Telephone Interviews

The Social Science Research Center (SSRC) at California State University, Fullerton conducted telephone interviews with persons in 1,027 randomly selected households located within the boundaries of the Arcade Creek watershed in the Sacramento area between September 26th and December 3rd, 2002, and with 602 persons in randomly selected households located within the boundaries of the Five Mile Slough watershed in the Stockton area. Between November 23rd, 2002 and February 1st, 2003, 1,603 persons in randomly selected households located in the San Francisco Bay area were surveyed via telephone. In 2000, 1,424 randomly selected residents in the San Diego Creek and East Costa Mesa/ Newport Beach Watershed areas in Orange County were surveyed. These surveys were conducted between August 29th and October 3rd, 2000.

[1] NOTE: We have not included data from another previous survey conducted by UCIPM and CSU Fullerton within the boundaries of San Diego Creek and East Costa Mesa/Newport Beach watershed areas in Orange County in 2001. These data are not included here because survey questions and methodology were different and not comparable. These 2001 surveys solicited minimal information via telephone and, instead, relied heavily on a "home inventory" mailed survey sent only to respondents that resided in single-family detached homes.

Survey samples were developed in consultation with Scientific Telephone Samples (STS), a proprietary firm specializing in the production of Random Digit Dial (RDD) telephone samples. For surveys conducted in Sacramento, Stockton, and Orange County, when ZIP code alone was not sufficient to determine whether a potential respondent resided within the watershed, extensive screening was undertaken. When it was not possible to establish that a potential respondent resided within the watershed boundary, she or he was excluded from the study. For the Bay area survey, ZIP code alone was sufficient to determine eligibility.

All samples were constructed in proportion to the number of households within the ZIP codes falling within the watershed boundaries of Arcade Creek, Five Mile Slough, and the San Diego Creek and East Coast Mesa/ Newport Beach watersheds; and proportionate to the 225 ZIP codes comprising the San Francisco Bay area.

Surveys were conducted from the SSRC's survey research laboratory, utilizing Computer Assisted Telephone Interviewing (CATI) equipment and software. The CATI system is a sophisticated information gathering protocol that contributes to the accuracy of data and to preserving the random nature of the sample.

RESULTS

Throughout this chapter, regional summaries presented result from "side-by-side" comparisons and do not denote statistically significant differences between regions. Where data are presented for a single watershed, statistically significant findings have been identified.

Respondent Demographics

Gender

In all four watersheds, females completed a larger proportion of surveys than did males. The proportion of female respondents ranged from 55.5% to 58.4%; the proportion of male respondents ranged from 41.5% to 44.4%.

Age

The largest proportions of survey respondents in the Bay area (24.9%), Arcade Creek (22.9%) and Five Mile Slough (22.9%) were between 61 and 90 years of age. However, the largest proportion of survey respondents in the San Diego Creek watershed area (located in East Costa Mesa, Orange County) was between 18 and 30 years of age (27.9% of the sample).

Race/ Ethnicity

The majority of respondents in each of the four watersheds self-identified as Caucasian or White. Arcade Creek had the highest proportion (76.4%) of Caucasian respondents, followed by 62.5% in San Diego Creek, 59.6% in Five Mile Slough, and 57.1% of respondents in the Bay

area. The second largest proportions of respondents in all survey areas self-identified as Hispanic/Latino. San Diego Creek in Orange County had the highest proportion of Latinos (23.8%), followed by 20.4% of Five Mile Slough residents, 16.6% of Bay area residents and 9.8% of Arcade Creek residents.

Total Annual Household Income

Surveys conducted in Sacramento, Stockton and Bay Area watersheds used a thirteen-level income variable ranging from "less than $20,000 per year" to "More than $175,000 per year." The survey conducted in Orange County used a six-level income variable ranging from "Less than $15,000 per year" to "More than $100,000." Consequently, total annual household income comparisons are made only between Sacramento, Stockton and Bay Area watersheds. Overall, Bay area respondents earn higher annual household incomes than other survey respondents. Over one-half of Arcade Creek (57.8%) and Five Mile Slough (56.4%) residents reported earning less than $50,000 per year, compared to 38.9% of Bay area residents in this income category. Conversely, 32.2% of Bay area residents report earning $90,000 or more annually, compared to 15.8% of Five Mile Slough and 13.8% of Arcade Creek residents.

Level of Education

The largest proportion of residents in Arcade Creek (30.7%), San Diego Creek in Orange County (25.3%) and in the Five Mile Slough watershed in Stockton (28.1%) indicated that they had some college education, but did not have a degree. The comparative proportion of Bay area residents with "some college" is 17.2%; the largest proportion (26.8%) of Bay area respondents reported having a Bachelor's degree. In all four surveyed areas, the smallest proportion of respondents had less than a high school diploma or GED.

Outdoor Pest Control

Who Applies Outdoor Pest Control Products

All survey respondents were asked, "Who at your residence applies outdoor pest control products?" Among Five Mile Slough residents 19.3% reported that no outdoor pest control products are applied at their residence; more than twice this proportion (40.6%) of Bay area respondents reported no outdoor application of pest control products. Approximately equal proportions of Arcade Creek (24.7%) and San Diego Creek (22.3%) residents report no application of pest control products at their residences.

For some analyses, classifications for this item were combined into three categories: Application by Others, Self Application, and No Application, as presented in Table 1 on the following page. Respondents that indicated that a commercial company, apartment complex or homeowner's association, only a pest control company, or their property owner or landlord applied pest control products are labeled "Application by Others". Respondents that indicated that they or another member of their household are responsible for pest control application are labeled "Self Application". Respondents that do not apply pest control products at their residence were so categorized.

Quotas were established to ensure that adequate numbers of residents in multi-family units (such as condominiums and apartments) were surveyed to support comparisons between residents in multi-family units and residents in single family units (such as single family detached homes and mobile homes). Since "who applies pest control products" is closely related to housing type, the establishment of these quotas affects the distribution of responses presented in Table 1 below.

As shown in Table 1, 29.5% of Bay area residents report application by others, compared to 48.2% of San Diego Creek watershed respondents. The proportions of Arcade Creek residents (37.2%) and Five Mile Slough residents (38.0%) that report application by others are very similar. The proportion of residents that reported self application of products is highest for residents of Five Mile Slough in Stockton (42.0%), and lowest in San Diego Creek in Orange County (26.9%). Compared to the other watershed areas, a higher proportion (41.4%) of Bay area respondents report no application of pest control products.

Table 1

Who applies outdoor products	Bay Area	Arcade Creek	Five Mile Slough	San Diego Creek
Application by others	29.5%	37.2%	38.0%	48.2%
Self application	29.2%	37.5%	42.0%	26.9%
No application	41.4%	25.3%	20.0%	24.8%
Total	100.0%	100.0%	100.0%	100.0%

Who Applies Products and Residence Type/ Ownership

For analytic purposes, "type of residence" and "home ownership" were combined to create a new variable. This new variable, detailed in Tables 2, 3, and 4 on the following pages, omits respondents who did not answer one or both of the original questions. To compare data from the four watersheds more easily, each of the "who applies" categories detailed in Table 1 above are presented separately below and on the following pages, beginning with the proportions of respondents, by "type of residence/ home ownership" that report "application by others."

Application by Others

Reading the second row of data in Table 2 on the next page, 61.6% of San Diego Creek residents that <u>own attached homes</u> report application by others. This falls to 39.4% of Bay area, 38.8% of Arcade Creek, and 32.1% of Five Mile Slough residents. Reading the last row of data, note that at least 70% of residents in Arcade Creek (72.5%), Five Mile Slough (70.0%), and San Diego Creek (75.7%) that currently <u>rent apartments</u> report application by others; far fewer (56.4%) Bay area residents that <u>rent apartments</u> report application by others. Again, due to the format of Table 2 below, and Tables 3 and 4 that follow, neither row nor column percentages will sum to 100%. To accurately compare survey data*, read across each row of numbers*.

Table 2 Proportion of Respondents that report *Application by Others of Pest Control Products* by Survey Area (column) and Residence Type/ Ownership (row)

	Bay Area	Arcade Creek	Five Mile Slough	San Diego Creek
Own a Single Family Detached Home	141 (18.6%)	103 (21.6%)	78 (26.4%)	143 (26.5%)
Own an Attached Home	37 (39.4%)	19 (38.8%)	9 (32.1%)	122 (61.6%)
Rent a Single Family Detached Home	38 (22.4%)	26 (28.9%)	21 (33.9%)	29 (23.2%)
Rent an Attached Home	22 (41.5%)	16 (43.2%)	20 (54.1%)	78 (67.2%)
Rent an Apartment	186 (56.4%)	182 (72.5%)	70 (70.0%)	215 (75.7%)

Self Application

As shown in Table 3 on the next page, over one-half (53.6%) of Five Mile Slough respondents that own an attached home (second row of data) report self-application of outdoor pest control products. This falls to just under one-third (32.7%) of Arcade Creek residents and less than one-quarter of Bay area (23.4%) and San Diego Creek (22.7%) residents. Reading the last row of data for respondents that rent apartments, a higher proportion (17.0%) of residents in Five Mile Slough report self-application of pest control products, compared to apartment dwellers in the Bay area (8.2%), Arcade Creek (9.2%) and San Diego Creek (4.2%).

Table 3 Proportion of Respondents that report *Self Application of Pest Control Products* by Survey Area (column) and Residence Type/ Ownership (row)

	Bay Area	Arcade Creek	Five Mile Slough	San Diego Creek
Own a Single Family Detached Home	304 (40.0%)	254 (53.4%)	153 (51.7%)	269 (49.9%)
Own an Attached Home	22 (23.4%)	16 (32.7%)	15 (53.6%)	45 (22.7%)
Rent a Single Family Detached Home	48 (28.2%)	27 (30.0%)	23 (37.1%)	40 (32.0%)
Rent an Attached Home	7 (13.2%)	10 (27.0%)	12 (32.4%)	16 (13.8%)
Rent an Apartment	27 (8.2%)	23 (9.2%)	17 (17.0%)	12 (4.2%)

No Application

Approximately one-quarter of respondents in the Arcade Creek watershed in Sacramento (25.0%), in the San Diego Creek watershed in Orange County (23.6%), and in the Five Mile Slough watershed in Stockton (22.0%) that own a single family detached home, report no application of pest control products at their residence. However, 41.4% of respondents in the Bay area watershed report no application of pest control products. Note also the comparatively high proportion (35.5%) of Bay area residents that rent an apartment that report no application of pest control products compared to residents in San Diego Creek (20.1%), Arcade Creek (18.3%) and Five Mile Slough (13.0%).

Table 4 Proportion of Respondents that report *No Application of Pest Control Products* by Survey Area (column) and Residence Type/ Ownership (row)

	Bay Area	Arcade Creek	Five Mile Slough	San Diego Creek
Own a Single Family Detached Home	315 (41.4%)	119 (25.0%)	65 (22.0%)	127 (23.6%)
Own an Attached Home	35 (37.2%)	14 (28.6%)	4 (14.3%)	31 (15.7%)
Rent a Single Family Detached Home	84 (49.4%)	37 (41.1%)	18 (29.9%)	56 (44.8%)
Rent an Attached Home	24 (45.3%)	11 (29.7%)	5 (13.5%)	22 (19.0%)
Rent an Apartment	117 (35.5%)	46 (18.3%)	13 (13.0%)	57 (20.1%)

Residents with Outside Application by Residence Type/ Ownership

To examine differences between respondents that report "application by others" (see Table 1) of pest control products, a three level variable was created. The first category consists of respondents that indicated that a commercial company, apartment complex or homeowner's association applied pest control products. Residents that reported that only a pest control company applied outdoor products, and residents that share this responsibility with a contracted company, comprise the second category. The third category consists of respondents that reported that their property owner or landlord applies pest control products. This new variable was then crosstabulated with the combined variable of residence type/ home ownership. Analyses for the Bay area, Arcade Creek and Five Mile Slough are presented separately.

Data suggest that respondents that rent their dwelling units may not be able to distinguish between a "commercial company, apartment complex, or homeowners association" and a "property owner or landlord" applying products. For instance, 70.0% of Bay area residents that

rent an apartment report that a "property owner or landlord" applies products and only 28.7% report that "a commercial company, apartment complex or homeowner's association" does. It is not possible to determine how respondents chose between these two options. It is possible, in other words, that respondents living in the same apartment complex answered the "who applies" question differently.

Although the tables below and on the following pages present data for these groups separately, a practical distinction may not exist. As such, these analyses should be interpreted with caution. These data indicate the need for a survey of rental property owners and managers to clarify specific questions regarding application of outdoor pest control products on rental properties.

Bay Area

As shown in Table 5, 53.5% of Bay area respondents that have outside people applying pesticides and own a single family detached home report that a direct-contracted company applies pest control products. Almost equal proportions of respondents that own an attached home (16.2%) and rent a single family detached home (15.8%) report that a company contracted directly by them is responsible for applying pest control products.

Table 5 Bay Area: Who applies outdoor pest control products (row) by Residence Type/ Ownership (column). Includes only the 29.5% of respondents who stated persons other than themselves and family members applied pesticides.

	Own a Single Family Detached Home	Own an Attached Home	Rent a Single Family Detached Home	Rent an Attached Home	Rent an Apartment
Commercial co., Apartment Complex or Homeowners Assoc.	33 (20.8%)	25 (67.6%)	6 (15.8%)	8 (36.4%)	54 (28.7%)
Yourself and a contracted company or just a contracted company	85 (53.5%)	6 (16.2%)	6 (15.8%)	0 (0.0%)	2 (1.1%)
Property owner or landlord	41 (25.8%)	6 (16.2%)	26 (68.4%)	14 (63.6%)	132 (70.0%)
Total	159 (100.0%)	37 (100.0%)	38 (100.0%)	22 (100.0%)	188 (100.0%)

$p. < .001$

Arcade Creek

As shown in Table 6 below, 49.1% of Arcade Creek respondents that own a single family detached home report that a direct-contracted company applies pest control products, compared to only 11.1% of respondents that rent a single family detached home, and 9.5% of respondents that own an attached home.

Table 6 Arcade Creek: Who applies outdoor pest control products (row) by Residence Type/ Ownership (column). Includes only the 37.2% of respondents who stated persons other than themselves and family members applied pesticides.

	Own a Single Family Detached Home	Own an Attached Home	Rent a Single Family Detached Home	Rent an Attached Home	Rent an Apartment
Commercial co., Apartment Complex or Homeowners Assoc.	55 (48.2%)	14 (66.7%)	10 (37.0%)	9 (52.9%)	101 (54.9%)
Yourself and a contracted company or just a contracted company	56 (49.1%)	2 (9.5%)	3 (11.1%)	1 (5.9%)	3 (1.6%)
Property owner or landlord	3 (2.6%)	5 (23.8%)	14 (51.9%)	7 (41.2%)	80 (43.5%)
Total	114 (100.0%)	21 (100.0%)	27 (100.0%)	17 (100.0%)	184 (100.0%)

p. < .001

Five Mile Slough

Similar to residents in Arcade Creek, 54.9% of Five Mile Slough that own a single family detached home report that a direct-contracted company applies pest control products, compared to only 13.0% of respondents that rent a single family detached home. However, none of the respondents that own attached homes report that a company contracted directly by them is responsible for the application of outdoor pest control products.

Table 7 Five Mile Slough: Who applies outdoor pest control products (row) by Residence Type/ Ownership (column). Includes only the 38% of respondents who stated persons other than themselves and family members applied pesticides.

	Own a Single Family Detached Home	Own an Attached Home	Rent a Single Family Detached Home	Rent an Attached Home	Rent an Apartment
Commercial co., Apartment Complex or Homeowners Assoc.	38 (41.8%)	8 (88.9%)	16 (69.6%)	13 (61.9%)	41 (58.6%)
Yourself and a contracted company or just a contracted company	50 (54.9%)	0 (0.0%)	3 (13.0%)	2 (9.5%)	0 (0.0%)
Property owner or landlord	3 (3.3%)	1 (11.1%)	4 (17.4%)	6 (28.6%)	29 (41.4%)
Total	91 (100.0%)	9 (100.0%)	23 (100.0%)	21 (100.0%)	70 (100.0%)

p. < .001

Outdoor Pest Problems

Outdoor Pests

Respondents were asked several questions regarding the main outdoor pests they encounter, focusing upon insects, snails and slugs, animals (such as birds and rodents), plant diseases, and weeds.

Insects

Overall, between 36.9% (of Bay area respondents) and 65.3% (of San Diego Creek respondents) reported insects to be a major outdoor pest problem around their residence. The proportions of respondents reporting insects to be problematic in the Five Mile Slough watershed area (48.0%) and in the Arcade Creek watershed area (45.4%) are similar.

Snails and Slugs

Compared to other watershed areas, a higher proportion (40.7%) of San Diego Creek residents reported a problem with snails/slugs around their residence. The proportions in the other surveyed areas of Five Mile Slough, Arcade Creek, and the Bay area (29.2%, 26.5% and 24.4%, respectively) are quite a bit lower, and similar to one another. In all surveyed areas except the Bay area, the proportion of residents that reported a problem with snails/ slugs was second only to the proportion that reported a problem with insects. In the Bay area, the second highest proportion of residents reported problems with animals.

Vertebrates

Over one-quarter (26.8%) of respondents in the Bay area watershed reported vertebrates to be problematic; followed by 24.4% of respondents in the San Diego Creek watershed in Orange County, 23.1% of respondents in the Arcade Creek watershed in Sacramento, and 14.5% of respondents in the Five Mile Slough watershed area in Stockton.

Plant Diseases

One in five (20.5%) San Diego Creek residents reported that plant diseases are a major outdoor problem around their residence. The proportion of San Diego Creek residents reporting plant diseases to be problematic is almost 2.5 times higher than the proportion of Arcade Creek residents (8.5%) reporting that plant diseases are a major outdoor problem. Similarly, only 8.1% of Bay area residents, and 5.6% of Five Mile Slough residents report such problems.

Weeds

The proportion of residents reporting weeds to be problematic is fairly close in all watershed areas, but is highest in Arcade Creek, with 19.9% of residents reporting weeds to be a

major outdoor problem. This drops to 15.5% in San Diego Creek, 15.3% in Five Mile Slough, and 14.7% in the Bay area.

How People Identify Outdoor Pests

The majority of respondents in the watershed areas stated that they use experience to identify their pest problems. In *ascending* order, 82.0% of Arcade Creek residents, 84.7% of Bay area and Five Mile Slough residents, and 88.8% of San Diego Creek residents reported that they use past experience to identify outdoor pest problems.

Almost equal proportions of respondents in the four watersheds rely on the help of store employees to identify their pest problems. Again in ascending order, 5.8% of Five Mile Slough residents, 7.2% of Arcade Creek residents, 7.8% of Bay area residents and 12.0% of San Diego Creek residents reported that they identify pests with the help of store employees.

Use of a Professional Pest Control Company

What Pests Prompted You to Hire a Professional Company?

Respondents that indicated that a contracted pest control company applies pest control products and respondents that share this responsibility with an external company were asked what pests prompted them to hire a professional company. The top three pests targeted in the Bay area were ants (59.5% of respondents), snails/ slugs (11.1%) and rats or mice (10.1%). The top three pests targeted in Arcade Creek were ants (66.6%), spiders (20.6%) and termites (14.2%). The top three pests targeted in Five Mile Slough were also ants (56.4%), spiders (32.7%) and termites (16.4%). Only surveys conducted in Sacramento, Stockton, and the Bay area contained this questionnaire item.

Pest Control Product Use Within the Past Six Months

Following a branching sequence, respondents who indicated that they or another member of their household apply outdoor pest control products, and respondents that share this responsibility with a contracted company, were asked a series of more detailed questions about their use and disposal of outdoor pest control products.

Number of Different Products Used in the Past Six Months

Over three-quarters (78.0%) of San Diego Creek residents reported that they had used a product within the past six months. This falls to 59.0% of Arcade Creek, 58.2% of Bay area, and 51.0% of Five Mile Slough residents. The average number of products used by residents is highest in San Diego Creek (1.74 per respondent) and then drops to 1.55 in Arcade Creek, 1.49 in Five Mile Slough and 1.47 in Five Mile Slough.

Target of the Pest Control Product

Respondents were asked to indicate the target for each pest control product they had used within the past six months. The most frequent response for residents in all four watersheds was "ants." For respondents in the Bay area, Arcade Creek, and San Diego Creek, the second most frequent response was "snails/slugs". The second most frequent response given by Five Mile Slough residents was "spiders".

Product Form

The largest proportions of the products used by respondents in all four watersheds were *ready-to-use sprays.* Approximately one-half (51.4%) of the products used by respondents in the Five Mile Slough watershed and one-half (50.4%) of the products used by respondents in the San Diego Creek watershed in the past six months were *ready-to-use sprays.* The proportion of *ready-to-use spray* products used by Arcade Creek respondents (46.9%) and by Bay area residents (45.7%) are also close to 50%.

Where was the Product Applied?

Residents of Sacramento, Stockton and the Bay area were asked where the pest control products used within the past six months were applied at their residences. The majority of respondents in all three watersheds reported that pest control products are applied to hard surfaces, such as the building perimeter, base of buildings, pet enclosures, driveways, sidewalks, patios, or walls. The proportions of Five Mile Slough (63.6%) and Arcade Creek (63.3%) residents that reported application on hard surfaces are almost equal. The proportion drops slightly to 57.5% of Bay area residents.

Product Point of Sale: Store Type

Respondents were asked which type of store they went to when they purchased their pest control products. The three most frequent responses were "large home supply store," "grocery/drug store," and "hardware store." As shown in Table 8 below, the distribution of responses for Five Mile Slough and Bay area respondents (the first two columns of data in the table below) are very similar, as are the distribution of responses for San Diego Creek and Arcade Creek respondents (the last two columns of data).

Overall, the largest proportions of products in the watersheds were purchased at large home supply stores, such as Home Depot. Far fewer products were purchased at hardware stores by residents in San Diego Creek (6.9% of the products) and by residents in Arcade Creek (8.8%) compared to products purchased by Five Mile Slough respondents (27.2%) and Bay area respondents (19.9%).

Table 8

Type of Store	Five Mile Slough	Bay Area	San Diego Creek	Arcade Creek
Large Home Supply Store	42.2%	42.0%	55.1%	51.4%
Grocery/ Drug Store	15.0%	15.7%	18.0%	18.9%
Hardware	27.2%	19.9%	6.9%	8.8%

Approximately equal proportions of products purchased by residents in San Diego Creek (8.1%), the Bay area (6.7%), and Arcade Creek (5.4%) were purchased at nurseries. However, only 1.2% of the products purchased within the past six months by Five Mile Slough residents were purchased at nurseries.

Product Point of Sale: Store Name

The largest proportion of products purchased by survey respondents in the four watersheds were purchased at Home Depot—although proportions ranged from a low of 28.1% of the products purchased by Bay area residents, 34.1% of the products purchased by Five Mile Slough residents, 46.1% of products purchased by Arcade Creek residents and to 49.2% of products purchased by San Diego Creek residents.

How Often People Apply Pest Control Products

The respondents that apply pest control products at home were asked to indicate the total number of times per year that they apply products. Of the respondents asked, 29.4% of residents in the San Diego Creek watershed area reported applying products seven or more times per year; compared to 17.5% of Five Mile Slough residents, 15.2% of Arcade Creek residents, and 9.8% of Bay area residents.

How Do You Decide How Much of the Product to Use?

In all watersheds, the majority of respondents indicated that they "read and follow all directions on the container" when deciding how much of a product to use. Three-quarters of the respondents in Five Mile Slough indicated that they "read and follow all directions on the container" followed by 67.1% of Bay area residents, 63.6% of Arcade Creek residents, and 61.9% of San Diego Creek residents.

Overall, the proportions of residents that estimate, rather than measure, the amount of product to use are quite high; however, compared to the other watersheds, a larger proportion of respondents in San Diego Creek (61.6%) reported that they estimate the amount of product to use. This drops to 52.4% of Bay area residents, 48.0% of Arcade Creek residents, and 43.8% of Five Mile Slough residents.

Pest Control Product Disposal

Respondents that apply pest control products at home were asked how they usually dispose of products that must be mixed with water, and how they dispose of products that they no longer use.

Disposal of Outdoor Products Mixed with Water

Almost equal proportions of residents in the Five Mile Slough watershed in Stockton (12.5%), Arcade Creek watershed area in Sacramento (10.0%), Bay area (8.9%), and San Diego Creek watershed in Orange County (8.0%) reported that they dispose of products that are mixed with water by throwing them in the trash.

Disposal of Pest Control Products No Longer Used

Approximately equal proportions of respondents in all four watersheds reported that they dispose of products that they no longer use by throwing them away, although the proportion of San Diego Creek residents (54.5%) is slightly higher than the proportions of Five Mile Slough (52.7%), Arcade Creek (51.6%) and Bay area (49.5%) residents. During survey administration to Sacramento, Stockton and Bay area residents, respondents could select multiple responses; however, only one response was allowed during survey administration to San Diego Creek residents. This may explain the slightly higher proportion of San Diego Creek residents reporting that they dispose of products that they no longer use by throwing them in the trash.

Disposal of Products Improperly

For some analyses, Sacramento, Stockton, and Bay area respondents were classified into those that do, and those that do not, dispose of pest control products improperly. Respondents that reported that they dispose of outdoor products mixed with water *or* products that they no longer use by pouring them down a drain or toilet inside the house, pouring them down a drain outside their house, pouring them in the street or gutter, or putting them in the trash were labeled "disposes of products improperly." Respondents that did not select *any of these options* were labeled "does not dispose of products improperly."

Of the 462 Bay area residents that apply products at home, 226 (48.9%) reported that they dispose of at least one product type improperly and 236 (51.1%) do not. Of the 380 Arcade Creek residents that apply products at home 180 (47.4%) use improper disposal methods and 200 (52.6%) do not; of the 245 Five Mile Slough residents that self-apply products, 115 (46.9%) dispose of them improperly and 130 do not.

Disposal of Pest Control Improperly and How Often Respondents Apply Pest Control Products

Within each watershed, respondents that dispose of products improperly were compared to residents that do not dispose of products improperly to examine the relationship between the

number of times per year that they apply pest control products; no significant differences were found.

Pest control Product Purchasing

How Do You Choose What Pest Control Products to Use?

Survey respondents in the San Diego Creek watershed area were read a list of criteria and were asked if they choose their pest control products based on each one. Survey respondents in Sacramento, Stockton and the Bay area were not read a list of options, but instead responded to an open-ended question. This resulted in San Diego Creek respondents, on average, naming more criteria. In addition, this survey method appears to have impacted the proportion of respondents that indicated that they choose products based on "socially desirable" criteria, such as environmental concerns. For instance, 43.0% of San Diego Creek respondents reported that they choose products based on "environmental concerns" *when this item was part of a list that was read to them*. Comparatively, 6.0% of Bay area residents, 10.7% of Arcade Creek residents, and 10.0% of Five Mile Slough residents volunteered that "environmental concerns" was a criterion on which they base their decision when choosing a pest control product. Similarly, when read the option "clearly written instructions", 40.0% of San Diego Creek residents indicated that they choose products based on this criterion, compared to 3.6% of Arcade Creek, 3.5% of Five Mile Slough, and 1.6% of Bay area residents that mentioned this item without prompting.

What Do People Read on a Pest Control Product Label?

The question, "What do you read or look at on a pest control product label before purchasing it?" was read to respondents in all survey areas. For surveys administered in Sacramento, Stockton, and the Bay area, the list of options was randomized; the list of options was not randomized for surveys administered in Orange County to residents in the San Diego Creek Watershed area.

The top three criteria selected by survey respondents in *all four watershed areas* were "the list of pests it controls," "how to apply," and "safety information." The bottom three criteria chosen by San Diego Creek, Arcade Creek, and Bay area residents were "when to treat," "what the ingredients are," and "disposal information." The bottom three criteria chosen by Five Mile Slough residents were "how much to use," "what the ingredients are," and "disposal information." In all four watersheds, "disposal information" was selected by the smallest proportion of respondents: 32.6% of Bay area residents, 26.4% in Arcade Creek, 24.9% in Five Mile Slough, and 29.1% in San Diego Creek. It is difficult to determine the extent to which the administration of this item by reading the response options influenced these data.

What Sources of Information Influence Your Decision?

In all four watersheds, store employees were among the top four responses to the question, "Where do you get your pest control information?" It was the second most common response of Bay area residents (26.3% of the sample) and San Diego Creek residents (23.5% of

the sample). It was the third most common response for Arcade Creek residents (17.4% of the sample) and the fourth most common response for Five Mile Slough residents (14.9% of the sample). Moreover, the most frequent answers given by respondents in the four watersheds were "product labels", "employee at the store where purchased", "word-of-mouth", and "advertisements".

Sources of Information that Influence Your Decision and Disposal of Products Improperly

No significant differences were found between the sources of information used by Bay area respondents that do and do not dispose of products improperly.

Of the 23 Arcade Creek respondents that selected the "Internet" as a source of information, 17 (73.9%) do not dispose of products improperly and six (26.1%) do. This relationship is statistically significant (_^{2}=4.48, p. < .05). Of the 78 Arcade Creek respondents that use "product labels" as a source of information, 47 (60.3%) reported that they dispose of products improperly and 31 (39.7%) do not (_^{2}=6.54, p. < .05). Thirty-nine of 52 (75.0%) Arcade Creek respondents that use "advertisements" as a source of information dispose of products improperly, compared to 13 (25.0%) who do not. This relationship is also statistically significant (_^{2}=18.45, p. < .001).

Only one source of information, "product labels" was significantly related to the improper disposal of products by Five Mile Slough respondents. Of the 42 respondents that use product labels as a source of information, 31 (73.8%) dispose of products improperly and eleven (26.2%) do not (_^{2}=14.70, p. < .001).

It was hypothesized that the use of "point of sale" sources of information (product labels, posters at the store where the product was purchased, tear sheets at the store where the product was purchased, and the use of employees at the store where the product was purchased) would be related to the improper disposal of pest control products. It was also hypothesized that the number of sources used by survey respondents would be related to improper disposal of products. However, no statistically significant differences were found.

Reliance on Store Employees as a Source of Information and Type of Store Where Product was Purchased

Respondents were asked, in general, about the sources of information that influence their decision about what pest control product to purchase. One of these options was "the employee at the store where I purchase products." Analyses were performed to examine the relationship between reliance on store employees, and the types of stores where products used during the past six months were purchased.

A higher proportion of respondents in the Bay area (55.6%) compared to Arcade Creek (27.3%) that had used a product within the past six months purchased at a <u>nursery</u> reported that "store employees," in general, influence their decision about what pest control products to purchase. Of respondents that purchased a product at a <u>hardware store</u>, 44.4% of Bay area,

21.6% of Five Mile Slough, and 17.4% of Arcade Creek respondents indicated that store employees influence their decision. None of the Bay area respondents and none of the Five Mile Slough respondents that purchased a product at a discount department store reported that they are influenced by store employees.

Of the Bay area respondents that had purchased a product at a large home supply store, 25.7% reported that they use "store employees" as a source of information. Only 19.5% of Arcade Creek residents and 17.4% of Five Mile Slough residents do so. One in five (20.0%) Bay area respondents that had purchased a product at a grocery or drug store is influenced by store employees, compared to 13.2% of Arcade Creek respondents and 4.0% of Five Mile Slough respondents.

Pest Control Product Storage

How Many Different Pest Control Products Are Stored in Your Home?

Only slight differences were found in the number of products that residents store in their homes. Just under 11% (11.1%) of Bay area respondents reported that do not have any products stored at their residences. This increases slightly to 12.9% of Arcade Creek respondents and 14.0% of Five Mile Slough respondents. Approximately 30% of Bay area (32.7%) and Arcade Creek (30.5%) respondents reported that they have one product stored; just under one-quarter (24.9%) of Five Mile Slough respondents have one product stored in their homes. Comparisons are presented only for these watershed areas since San Diego Creek residents' answers were collected using a categorical response matrix.

Age of Oldest Pest Control Product

If a respondent had at least one product in their home, they were asked to provide the age of the oldest product that they have in their residence. Compared to other survey areas, a higher proportion (67.0%) of Five Mile Slough residents indicated that the oldest product in their residence was "less than one year old." This falls to 59.8% of Arcade Creek residents and 56.9% of Bay area residents. Approximately one-quarter of respondents in the Bay area (24.2%), Arcade Creek (23.8%) and Five Mile Slough (21.6%) report that their oldest product is "older than one year." A higher proportion of Bay area residents (19.0%) have products either "older than three years" or "older than five years;" the corresponding proportions in Arcade Creek (16.4%) and Five Mile Slough (11.3%) are smaller. Due to differences in the way the question was worded, comparisons are made only between data obtained from Sacramento, Stockton, and Bay area respondents.

POTENTIAL USE OF ENVIRONMENTALLY-FRIENDLY PEST CONTROL COMPANY

All survey residents in Sacramento, Stockton, and the Bay area were asked a series of questions regarding the likelihood that they would hire a pest control company that posed less risk to the environment. Data for all survey respondents is presented first, followed by survey responses for residents that currently contract with a professional pest control company.

All Survey Respondents

How likely are you to Hire an Environmentally Friendly Pest Control Company?

Close to one-half of the respondents in the Bay (49.1%), Arcade Creek (47.0%), and Five Mile Slough (44.8%) watersheds reported that they would be "not at all likely" to hire an environmentally friendly pest control company.

Respondents that indicated that they were either "somewhat likely" or "very likely" to hire an environmentally friendly company or professional were asked a series of questions to determine the extent to which their likelihood of hiring such a company was affected by factors such as cost, a slower method, and the necessity for more follow-up visits.

How Likely if Services Cost More?

Almost equal proportions of residents in the Bay (43.6%), Arcade Creek (45.1%) and Five Mile Slough (45.5%) watersheds indicated that they would be "somewhat less likely" to hire such a company if the services cost more. Approximately one in five (21.0%) Arcade Creek respondents indicated that they would be "a great deal less likely;" whereas only 14.8% of Five Mile Slough respondents and 13.4% of Bay area respondents indicated that they would be "a great deal less likely."

How Likely if Treatment Method was Slower?

The largest proportions of respondents in the Bay area (58.0%), Arcade Creek (49.7%) and Five Mile Slough (49.5%) watersheds indicated that it "would not influence their decision" to hire a company that posed less risk to the environment if the treatment method was slower. However, 10.6% of Bay area respondents, 14.3% of Arcade Creek respondents, and 18.7% of Five Mile Slough respondents indicated that they would be "a great deal less likely."

How Likely if More Follow-up Visits were Necessary

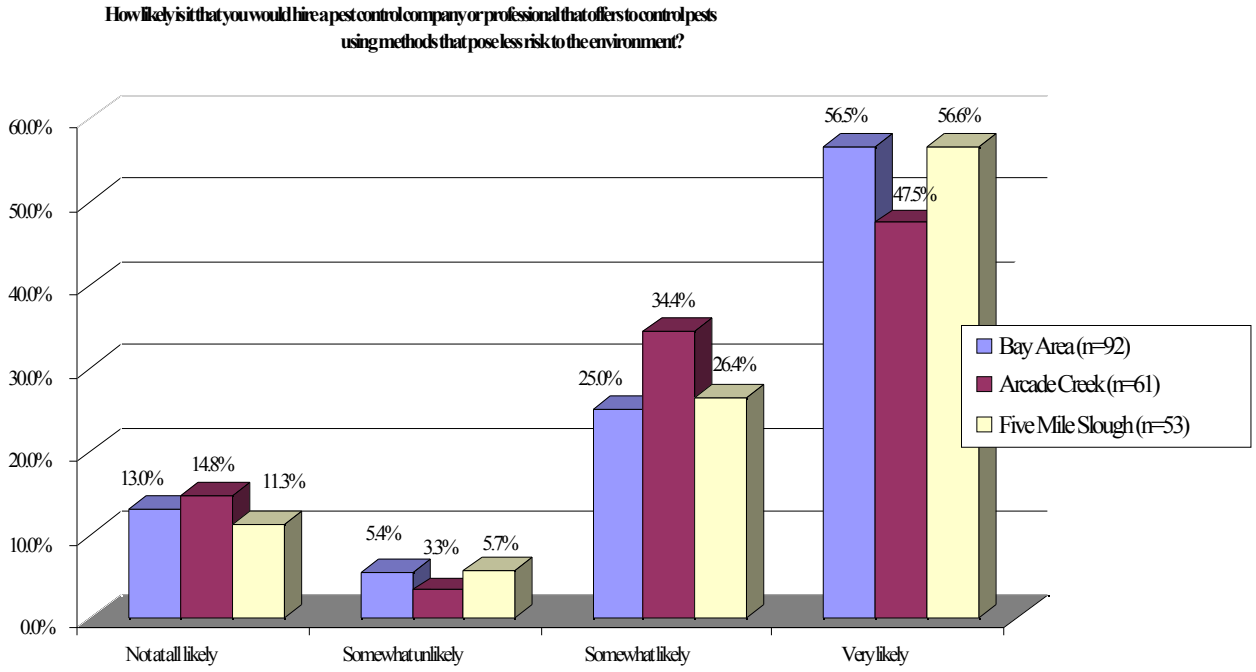
Approximately equal proportions of respondents in the Bay area (56.4%), Arcade Creek (55.4%) and Five Mile Slough (56.3%) survey areas indicated that it "would not influence their decision" to hire such a company if more follow-up visits were necessary.

Respondents that Contract with a Professional Pest Control Company

In the Bay area, 106 respondents (6.9% of respondents that answered the question) indicated that "myself and a pest control company that I contract with directly" or "Only a pest control company that I contract with directly" was responsible for the application of outdoor pest control products. Sixty-eight Arcade Creek respondents (6.9%) and 57 Five Mile Slough respondents (10.1%) indicated that they contract directly with a professional pest control company.

The following analyses present the distribution of responses just for these residents that already contract with a professional pest control company. Only valid survey responses are presented in the analyses (respondents that reported that they "don't know" and respondents that refused to answer the questions have been omitted).

Combining the proportions of respondents that indicated that they were "somewhat likely" or "very likely," 81.5% of Bay area, 81.9% of Arcade Creek, and 83.0% of Five Mile Slough respondents are either "somewhat likely" or "very likely" to hire an environmentally friendly company. All valid survey responses are presented in the graph below.



How Likely if Services Cost More?

Almost equal proportions of residents in the Bay area (8.6%) and Five Mile Slough (10.3%) watersheds indicated that they would be "a great deal less likely" to hire such a company if the services cost more; the correspondent proportion of Arcade Creek residents is 14%. Forty-one percent of Five Mile Slough respondents, 50% of Bay area respondents, and 58.0% of Arcade Creek respondents indicated that they would be "somewhat less likely." Compared to the proportion of respondents in the Bay area (41.4%) and Five Mile Slough (48.7%), the proportion of residents in Arcade Creek (28.0%) that reported that it "would not influence my decision" is quite a bit lower.

How Likely if Treatment Method was Slower?

The distribution of responses on this item for Bay area and Five Mile Slough respondents that contract with a pest control company are quite close. Approximately 7% of Bay area (7.7%) and Five Mile Slough (7.1%) respondents indicated that they would be "a great deal less likely"; 35.4% of Bay area and 33.3% of Five Mile Slough respondents would be "somewhat less likely;" and 56.9% of Bay area and 59.9% of Five Mile Slough respondents said "it would not influence their decision" to hire a company that posed less risk to the environment if the treatment method was slower. However, 12.2% of Arcade Creek respondents reported that they would be "a deal less likely," 40.8% would be "somewhat less likely" and 46.9% said it would not influence their decision.

How Likely if More Follow-up Visits were Necessary

A smaller proportion (4.7%) of Five Mile Slough residents, compared to 10.1% of Bay area and 12.2% of Arcade Creek residents, reported that they would be "a great deal less likely" to hire such a company if more follow-up visits were necessary. Approximately equal proportions of Arcade Creek (30.6%) and Five Mile Slough (30.2%) respondents would be "somewhat less likely"; compared to only 20.3% of Bay area residents. Bay area residents seem less concerned about hiring a company if more follow up visits are necessary as evidenced by 69.6% of respondents indicating that "it would not influence their decision"; 65.1% of Five Mile Slough and 57.1% of Arcade Creek residents' decisions would not be influenced.

Pesticides and Water Quality

Only respondents in Sacramento, Stockton and the Bay areas were asked about their beliefs regarding the relationship between pesticide use and water quality.

Extent to Which Pesticides Make it Into Local Creeks, Rivers and Bays

Approximately equal proportions of respondents in the Five Mile Slough (30.9%), Bay area (30.6%), and Arcade Creek (28.2%) watersheds indicated that that they believed "to some extent" that pesticides <u>make it into local creeks, rivers, and bays</u>. Approximately 16% (16.5%) of respondents in the Arcade Creek watershed believe this "not at all" compared to 18.4% of Bay area residents and 22.7% of Five Mile Slough residents.

Extent to Which Pesticides Make it Into Local Creeks, Rivers and Bays and Disposal of Products Improperly

Table 9 on the next page presents the proportion of respondents in each watershed that do and do not dispose of at least one product type improperly that believe "not at all," "to a small extent," "to some extent," or "to a large extent" that pesticides <u>make it into</u> local creeks, rivers, and bays. Because of table format, neither row nor column percentages sum to 100%.

As shown in Table 9, among residents in the Five Mile Slough watershed in Stockton (the last two columns of data), of the respondents that believe "not at all" that pesticides used around residences make it into local creeks, rivers and bays, 60.0% dispose of products improperly, compared to 54.5% of respondents that believe this "to a small extent," 40.3% that believe "to some extent" and 34.1% that believe "to a large extent" that pesticides make it into local creeks rivers and bays. As the extent to which respondents believe that pesticides make it into local creeks, rivers and bays increases, a smaller proportion report disposing of products improperly.

The differences in the distribution of responses for residents in the Bay area watershed and residents in the Arcade Creek watershed in Sacramento are not as pronounced. Close to one-half of Bay area residents in each of the response categories dispose of products improperly and between 43% and 50% of respondents in Arcade Creek do so—regardless of the extent to which they believe pesticides make it into local creeks, rivers, and bays.

Table 9 The proportion of respondents in each watershed that do and do not dispose of products improperly (column) by the Extent to which respondents believe that pesticides make it into local creeks, rivers, and bays (row)

	Bay Area		Arcade Creek		Five Mile Slough	
	Improper Disposal	No Improper Disposal	Improper Disposal	No Improper Disposal	Improper Disposal	No Improper Disposal
Not at all	48.3%	51.7%	50.9%	49.1%	60.0%	40.0%
To a small extent	48.1%	51.9%	47.4%	52.6%	54.5%	45.5%
To some extent	47.3%	52.7%	42.9%	57.1%	40.3%	59.7%
To a large extent	52.3%	47.7%	49.4%	50.6%	34.1%	65.9%

Extent to Which Pesticides Affect Water Quality in Local Creeks, Rivers and Bays

Approximately equal proportions of respondents in the Bay (33.3%), Five Mile Slough (31.8%), and Arcade Creek (31.7%) survey areas indicated that they believed "to some extent" that pesticides affect the water quality in the local creeks, rivers, and bays. Overall, differences between survey data differ by less than 5%.

Extent to Which Pesticides Make it Into Local Creeks, Rivers and Bays and Disposal of Products Improperly

Table 10 below presents the proportion of respondents in each watershed that believe "not at all," "to a small extent," "to some extent," and "to a large extent" that pesticides affect the water quality in local creeks, rivers, and bays that dispose of products improperly.

One would expect a smaller proportion of respondents that believe "to a large extent" that pesticides affect the water quality in local creeks, rivers, and bays to report disposing of products improperly. However, as shown in Table 10 below, reading the last row of data, over one-half of Bay area (56.5%) and Arcade Creek residents (50.6%) that believe "to a large extent" that pesticides affect the water quality report disposing of products improperly. Although lower than the Bay area and Arcade Creek, over one-third (34.0%) of respondents in Five Mile Slough report disposing of products improperly, even though they believe "to a large extent" that pesticides affect the water quality in local creeks, rivers, and bays.

Table 10 The proportion of respondents in each watershed that do and do not dispose of products improperly (column) by the Extent to which respondents believe that pesticides affect the water quality in local creeks, rivers, and bays (row).

	Bay Area		Arcade Creek		Five Mile Slough	
	Improper Disposal	No Improper Disposal	Improper Disposal	No Improper Disposal	Improper Disposal	No Improper Disposal
Not at all	40.6%	59.4%	43.6%	56.4%	53.7%	46.3%
To a small extent	54.7%	45.3%	47.3%	52.7%	56.2%	43.8%
To some extent	42.4%	57.6%	47.3%	52.7%	39.7%	60.3%
To a large extent	56.5%	43.5%	50.6%	49.4%	34.0%	66.0%

Awareness of Water Quality Posters, Brochures, or Billboards

All survey respondents in Sacramento, Stockton, and the Bay area were asked, "Have you heard or seen anything in the media or on posters, brochures, or billboards about pesticide use and water quality in the last year?" Just over 45% (45.3%) of Arcade Creek residents indicated that they had heard or seen something in the media or on posters, brochures, or billboards about pesticide use and water quality within the last year. This proportion falls to 40.5% of Five Mile Slough and 40.1% of Bay area residents.

Source of this Information

Respondents were asked for the source of the message regarding pesticide use and water quality regardless of their ability to describe the message that they had heard or seen. Of the respondents that could identify a source (between 12% and 19% of respondents could not), 27.7% of Bay area, 26.2% of Arcade Creek, and 21.3% of Five Mile Slough residents indicated that they saw a message related to pesticides and water quality on television. Almost equal proportions of Bay area (26.6%) and Five Mile Slough (26.3%) residents saw or read a message in the newspaper, whereas only 7.5% of Arcade Creek residents saw or read a message in the

newspaper. Over one-quarter (26.2%) of the messages seen or read by Arcade Creek residents were seen on television.

Have you done anything differently in response to this information?

Of the Bay area residents asked, 174 of 631 (28.0%) indicated that they had done something in response to the information that they had heard or seen. This falls to one-quarter (25.1%) of Arcade Creek residents (113 of 458) and falls again to 18.9% of Five Mile Slough residents (43 of 238).

Chapter 3: Sacramento/Arcade Creek Watershed Survey

METHOD

Development of the Survey Instrument

As described in Chapter 2, we adapted a survey instrument used in the 2000 Orange County urban pesticide use study developed by Cheryl Wilen, Area IPM Advisor, UC Statewide IPM Program in consultation with various pest management experts and survey specialists at the Social Science Research Center at California State University, Fullerton. For the 2002-03 northern California surveys, this survey was reviewed and revised under the direction of Mary Louise Flint based on input from representatives of the California Department of Pesticide Regulation, the San Francisco Bay Area and the Central Valley Regional Water Quality Control Board who served as a technical advisory committee. Questions were added to further elucidate understanding of water quality issues, disposal practices, issues related to hiring pest control firms and willingness to hire professionals who implement more environmentally sound practices. Copies of the survey questions are included in Appendix A.

Telephone surveys

During the Fall of 2002, telephone interviews were conducted by staff of the Social Science Research Center, CSU Fullerton with persons in 1,027 randomly selected households located within the boundaries of the Arcade Creek watershed in the Sacramento area. A total of 983 interviews were completed in English and 44 in Spanish or in a mix of Spanish and English. Telephone interviews were conducted from the SSRC's survey research laboratory, utilizing Computer Assisted Telephone Interviewing (CATI) equipment and software. The CATI system is a sophisticated information gathering protocol that contributes to the accuracy of data and to preserving the random nature of the sample.

Telephone interviews were conducted between September 26th and December 3rd, 2002, Monday through Thursday from 4-9 p.m., and on Saturdays and Sundays from 2:00 p.m. to 8:00 p.m. The questionnaire consisted of approximately 70 items and required from one to thirty-three minutes to complete. The average survey administration time depends upon whether pest control products are used in a household, and if so, who applies them. Respondents in households that applied no outdoor pest control products required an average of six minutes and 58 seconds to complete the survey. When an outside company applied pest control products, the survey required an average of seven minutes and 33 seconds. Respondents that applied products themselves or shared this responsibility with an outside company required an averaged of twelve minutes and 41 seconds to complete the survey.

The survey sample was developed in consultation with Scientific Telephone Samples (STS), a proprietary firm specializing in the production of Random Digit Dial (RDD) telephone samples. The sample was constructed in proportion to the number of households within each of eleven Zip codes falling within the watershed boundary. When zip code alone was not sufficient to determine whether a potential respondent resided within the watershed, extensive screening was undertaken (see Appendix A to review the survey instrument and the script for this process).

When it was not possible to establish that a potential respondent resided within the watershed boundary, she or he was excluded from the study.

The sample frame consisted of both listed and unlisted, old and recently established telephone numbers of all households within the designated watershed. Therefore, every household in this area with a telephone had an equal non-zero chance of being selected to participate in the study. It is estimated that the penetration of phone lines in residential households in California is over 95%. The precise proportion of households in the Arcade Creek watershed with telephones is unknown. It is our belief that no major events occurred during the interview period that might have affected responses to the survey items.

To complete 1,027 interviews, 56,714 individual dialing attempts were made to 8,133 unique telephone numbers. About 26% (26.4%) of the interviews were completed on the first attempt, 15.2% on the second, 11.0% on the third attempt, 8.6% on the fourth call, and 38.8% on the fifth or higher attempt. This persistence paid off in a response rate of 72.86%; an excellent outcome for an RDD study of this length. The final disposition of each unique telephone number attempted is depicted in Table 1 below.

Table 1

Final Dispositions for Sample Records	
Completes	1027
No Answer	799
Busy	120
Answering Machine/ Voice Mail	555
Phone Disconnect	1707
Fax Machine	529
Incoherent	104
Not a Residence	538
Spanish Language	7
Other Language	146
Teenager Phone	22
Qualified Refusal	73
Unqualified Refusal	462
Qualified Callback	115
Unqualified Callback	152
Complete Came Back	3
Not Qualified	1365
Not Available Project Dates/ Hours	5
Call Blocked	7
Unsure if Residence is in Watershed	57
Quota Cell Full	340
Total Sample	**8,133**

Pearson Chi-Square Analyses

Throughout this report, the Pearson chi-square test is performed to examine the relationship between two categorical variables (e.g. respondent level of education and the manner in which pest control products are disposed). A statistically significant chi-square, with alpha set at $p < .05$ indicates that the observed relationship is likely to occur by chance or sampling error *less than one in twenty times*. An alpha value of .01 denotes that the observed relationship is likely to occur by chance *less than one in one hundred times.*

Optimum use of the Pearson Chi-Square Test ($_^2$) requires that no more than 20% of the cells in the crosstabulation table have expected cell counts less that five. If this assumption is not met, even when the observed relationship appears to be strong, it must be interpreted with caution. Consequently, only analyses that meet expected cell count criteria (greater than five) are presented.

RESULTS

Respondent Demographics

Gender

At the conclusion of each survey, interviewers coded respondent gender. Females completed 570 interviews (55.5%) and males 456 (44.4%). Interviewers were unable to determine the gender of one respondent by voice alone.

Age

Respondents average 44.89 years of age. The median age is 43. As depicted in the table below, the proportion of respondents in each age group is approximately equal other than those 51 to 60. The proportion in this age group is lower (13.9%) than in any other category.

Table 2

Age	Frequency	Percent
18 to 30	213	20.7%
31 to 40	230	22.4%
41 to 50	210	20.4%
51 to 60	143	13.9%
61and older	231	22.5%
Total	1027	100.0%

Presence of Children in Residence

Ten respondents refused to indicate whether children younger than 18 currently reside with them. Of the 1,017 valid responses, 387 (38.1%) do have children living with them and 630 (61.9%) do not.

Race/Ethnicity

As depicted by Table 3 on the following page, the largest racial/ethnic group is Caucasian/ White (76.4%), with Hispanics/ Latinos comprising about ten percent of the total. Twenty-three of 1,027 respondents (2.2%) refused to disclose their racial/ethnic background.

Seven of the 19 respondents (36.8%) that specified their race/ethnicity as "other" self-identify as Native American and three (15.7%) as Middle Eastern. Eight respondents did not provide further detail. Six of 38 (15.8%) Asian respondents self-identify as Pacific Islander, five (13.2%) Korean, five (13.2%) Japanese, four (10.5%) Asian Indian and four (10.5%) Filipino. Other Asian responses include Chinese, Laotian, Vietnamese, and Thai.

Table 3

Race/Ethnicity	Frequency	Percent
Asian	38	3.8%
Black or African American	51	5.1%
Hispanic or Latino	98	9.8%
Caucasian or White	767	76.4%
Bi- or Multi-Racial	31	3.1%
Other	19	1.9%
Declined to state	23	Omitted from total
Total	1,027	100.0%

Primary Language Spoken at Home

Most respondents (93.7%) indicate that English is the primary language spoken at home. Just 4.8% report that Spanish is the primary language spoken at home. Other responses included West European languages (such as German, French and Portuguese), Russian, Cambodian, Filipino, East Indian languages (such as Hindi and Gujarati) and Tagalog.

Race/Ethnicity and Primary Language of Interview

Respondent race/ ethnicity and language of interview were combined to form a single variable to examine differences between English speaking Latino, Spanish speaking Latino, and all other English-speaking respondents. Recall that interviews were conducted only in English and Spanish. Table 4 details this new variable. Respondents that were classified as "other" race/ethnicity, or did not provide this information, are excluded. As depicted in the table, the largest proportion (n=902, 90.2%) of respondents are English-speaking non-Latino. The next largest category (n=58, 5.8%) is English-speaking Latinos, followed closely by Spanish-speaking Latinos (n=40, 4.0%). Of the 98 Latino respondents in this sample, 58 (59.1%) completed the survey in English and 40 (40.9%) completed the survey in Spanish.

Table 4

Race/ Ethnicity and Language of Interview	Frequency	Percent
English Speaking Latino	58	5.8%
Spanish Speaking Latino	40	4.0%
English Speaking All Others	902	90.2%
Total	1,000	100.0%

Total Annual Household Income

A total of 267 respondents (26.0% of the total sample) either did not know or declined to state their total annual household income. The percentages in Table 5 below are computed based upon valid replies. Note that total annual household income is well distributed across categories ranging from "Less than $20,000" to "More than $175,000." The distribution is positively skewed, however. Forty-three and one half percent of those reporting a total annual household income earn less than $40,000 annually (first three rows of Table 5).

Table 5

Total Annual Household Income	Frequency	Percent
Less than $20,000	101	13.3%
Between $20,000 and $29,999	102	13.4%
Between $30,000 and $39, 999	128	16.8%
Between $40,000 and $49, 999	109	14.3%
Between $50,000 and $59,000	80	10.5%
Between $60,000 and $69,000	57	7.5%
Between $70,000 and $79,999	47	6.2%
Between $80,000 and $89,999	31	4.1%
Between $90,000 and $99,999	25	3.3%
Between $100,000 and $124,999	42	5.5%
Between $125,000 and $149,999	15	2.0%
Between $150,000 and $174,999	6	.8%
More than $175,000	17	2.2%
Total	760	100.0%

City of Residence

As indicated by Table 6 below, the largest proportions of the sample reside in Sacramento (33.7%) and Citrus Heights (33.7%). These are followed by 125 respondents (12.2%) in Carmichael and 116 (11.3%) in Fair Oaks. During survey administration, fourteen (1.4%) of the 1,027 respondents refused to disclose their city of residence. City information for

these residents was obtained using their residential Zip Code, which was provided during the initial screening process.

Table 6

City of Residence	Frequency	Percent
Carmichael	125	12.2%
Citrus Heights	346	33.7%
Fair Oaks	116	11.3%
North Highlands	36	3.5%
Orangeville	44	4.3%
Sacramento	346	33.7%
Stockton	14	1.4%
Total	1,027	100.0%

Level of Education

As depicted in Table 7, of the 1,006 survey respondents that answered, the largest proportion --just less than one third (30.7%)-- completed some college but do not have a degree, followed by 267 (26.5%) that report having a high school diploma or GED. Note that education and total annual household income are associated with housing type, and quotas established for multiple-unit attached housing (see next page) have resulted in the over-representation of such households in the final data set. Therefore, the distribution of total annual household income and educational attainment in the survey sample does not accurately represent the entire population of the Arcade Creek Watershed (because of the over-representation of apartments and attached homes, these variables are skewed toward the lower end).

Table 7

Educational Attainment	Frequency	Percent
Less than high school diploma/GED	63	6.3%
High school diploma/GED	267	26.5%
Some college, no degree	309	30.7%
Associate degree	131	13.0%
Bachelor's degree	139	13.8%
Graduate or Professional Degree	97	9.6%
Total	1,006	100.0%

Type of Residence

Previous studies conducted in San Diego and Orange Counties revealed that persons residing in apartments and attached homes (multi-family units) rarely assume personal responsibility for the application of pest control products at their residences. Consequently, they are unable to respond to questions regarding product use and disposal. Residents in multi-family attached units are nevertheless an important component of the population. To allocate survey resources most effectively, a quota was established to limit completed surveys from residents in attached homes, apartments, and other residential types (such as school dormitories) to 400. In contrast, 626 completions were obtained from residents in single-family detached homes and mobile homes.

The leftmost columns in Table 8 below depict the distribution of responses prior to November 5th, when the quota on multiple-unit attached homes was imposed. This distribution is the most accurate portrait of the housing stock in the Arcade Creek Watershed. The columns to the right in Table 8 depict the distribution of all survey respondents after the imposition of the quota. These data (in the right columns) are used for analytic purposes throughout the report. Because multiple-unit attached housing is actually over-represented in the final data set, variables closely associated with residential type (such as household income, city of residence and home ownership) do not accurately depict the population residing within the Arcade Creek Watershed Area. These data are well-suited, however, to between-category comparisons.

As indicated by Table 8, over two-thirds (67.1%) of the respondents that completed surveys prior to November 5th report living in a single family detached home and 188 (21.6%) reside in apartments. The final proportion of residents in single-family detached homes dropped to 58.1% and the final, overall proportion of residents in apartments rose to 29.1%.

Table 8

	Interviews Completed Before November 5, 2002		All survey respondents	
Type of Residence	Frequency	Percent	Frequency	Percent
Single-family detached home	583	67.1%	594	58.1%
Attached home	63	7.2%	96	9.4%
Apartment	188	21.6%	298	29.1%
Mobile home	32	3.7%	32	3.1%
Other	3	.3%	3	.3%
Refused	3	Omitted	4	Omitted
Total	872	100.0%	1,027	100.0%

Home Ownership

Seventeen respondents did not reply to a question concerning ownership of their residence. Of the 1,010 respondents who supplied an answer, 587 (58.1%) reported that they own their residence, while 423 (41.9%) reported that they rent.

For analytic purposes, "type of residence" and "home ownership" were combined to create a new variable. Table 9 below presents this combined variable, omitting respondents who did not answer one or both of the original questions. As shown in Table 9, over one-half (51.3%) of residents own single family detached homes, followed by 279 (29.1%) that rent apartments. The small number of respondents that reported owning or renting a mobile home, owning an apartment, or owning or renting something else (such as a boat utilized as living quarters) were omitted from this analysis.

Table 9

House Type/ Ownership	Frequency	Percent
Own a single family detached home	491	51.3%
Own an attached home	53	5.5%
Rent a single family detached home	94	9.8%
Rent an attached home	41	4.3%
Rent an apartment	279	29.1%
Total	958	100.0%

Home Ownership/ Residential Type by City of Residence

Table 10 on the next page depicts the distribution of housing type by city. Only data collected before the imposition of quotas are presented to more accurately reflect the actual distribution of housing in those cities. As shown in Table 10, close to 60% (58.8%) of the respondents in Carmichael, two thirds (66.2%) of Citrus Heights residents and close to three-quarters (73.5%) of Fair Oaks residents indicated that they currently own a single family detached home. The largest proportion (44.1%) of residents in Sacramento currently own single family detached homes; however a higher proportion (28.1%) of Sacramento residents rent apartments compared to residents in other cities. Differences in these proportions by city are statistically significant.

Table 10 Home Ownership (row) by City of Residence (column) for Interviews Completed Before Quotas were Established.

	Carmichael	Citrus Heights	Fair Oaks	Sacramento
Own Detached home	60 (58.8%)	186 (66.2%)	75 (73.5%)	116 (44.1%)
Own Attached Home	4 (3.9%)	14 (5.0%)	2 (2.0%)	17 (6.5%)
Rent Detached Home	10 (9.8%)	17 (6.0%)	9 (8.8%)	44 (16.7%)
Rent Attached Home	2 (2.0%)	10 (3.6%)	1 (1.0%)	12 (4.6%)
Rent Apartment	26 (25.5%)	54 (19.2%)	15 (14.7%)	74 (28.1%)
Total	102 (100.0%)	281 (100.0%)	102 (100.0%)	263 (100.0%)

p.< .001

OUTDOOR PEST CONTROL

Who Applies Outdoor Pest Control Products

All survey respondents were asked, "Who at your residence applies outdoor pest control products?" As depicted in Table 11 on the following page, slightly more than one third of survey respondents (36.6%) indicated that either they (33.6%) or another member of their household (3.0%) is responsible for outdoor pest control product application. One hundred and ninety-seven (20.0%) respondents report that a commercial company, apartment complex, or homeowner's association not directly contracted by them is responsible for outdoor pesticide application. Almost one-quarter (24.7%) of the respondents surveyed indicated that no outdoor pest control products are applied at their residence. Forty respondents did not provide a response.

Table 11

Who applies outdoor products	Frequency	Percent
Yourself	332	33.6%
Another Member of the household	30	3.0%
Commercial co., Apt. Complex or Home Owner's Association	197	20.0%
Yourself and a pest control company	18	1.8%
Only a pest control company	50	5.1%
Property Owner or Landlord	112	11.3%
Other	4	.4%
No outdoor pest control products are applied	244	24.7%
Total	987	100.0%

For some analyses, the pest control product application classifications above were combined into three categories: Application by others, Self application, and No application of outdoor pest control products. Respondents that indicated that a commercial company, apartment complex or homeowner's association (n=197); only a pest control company (n=50); or their property owner or landlord (n=112) applied pest control products are labeled "Application by others." Respondents that indicated that they (n=332) or another member of their household (n=30) are responsible for pest control application are labeled "Self Application". The 244 respondents that do not apply pest control products at their residence were so categorized, as illustrated by Table 12 below. The eighteen respondents that share the responsibility for product application with a pest control company and the four respondents that indicated "other" were omitted from analysis.

Table 12

Who applies outdoor products	Frequency	Percent
Application by others (Commercial Co., Apt. Complex, Homeowners Assoc., Contracted Company)	359	37.2%
Self Application (respondent or another member of household)	362	37.5%
No outdoor pest control products are applied	244	25.3%
Total	965	100.0%

Who Applies Products and Residence Type/ Ownership

As depicted in Table 13 below, over one-half (53.4%) of survey respondents that currently <u>own a single family detached home</u> report that someone within their household applies

outdoor pest control products. Although the largest proportion of residents that own an attached home (38.8%), rent an attached home (43.2%), or rent an apartment (72.5%) report that an outside company is responsible for product application, not surprisingly, the proportion that rent an apartment (72.5%) is much higher than the proportion in the other two categories. Among survey respondents that rent a single family detached home, the greatest proportion (41.1%) report no application of products at their residence. The relationship between "Who applies pest control products" and "Residence Type/ Ownership" is statistically significant.

Table 13 Who Applies Outdoor Pest Control Products (row) by Residence Type/ Ownership (column)

	Own a Single Family Detached Home	Own an Attached Home	Rent a Single Family Detached Home	Rent an Attached Home	Rent an Apartment
Application by others	103 (21.6%)	19 (38.8%)	26 (28.9%)	16 (43.2%)	182 (72.5%)
Self application	254 (53.4%)	16 (32.7%)	27 (30.0%)	10 (27.0%)	23 (9.2%)
No outdoor pest control products are applied	119 (25.0%)	14 (28.6%)	37 (41.1%)	11 (29.7%)	46 (18.3%)
Total	476 (100.0%)	49 (100.0%)	90 (100.0%)	37 (100.0%)	251 (100.0%)

p. < .001

Use of a Professional Pest Control Company

What Pests Prompted You to Hire a Professional Company?

Respondents that indicated that a contracted pest control company applies pest control products (n=50), and respondents that share this responsibility with an outside company (n=18), were asked what pests prompted them to hire a professional company. Of the 68 respondents asked, five respondents did not know. The 63 respondents that could identify the pest(s) that prompted them to hire a professional company named 84 pests. The percentages in Table 14 are based on the 63 respondents, not on the 84 pests that they named. As depicted in Table 14, of the 63 respondents that identified a problem, 42 (66.6%) indicated that they hired an outside pest control company to combat ants, 13 (20.6%) to control spiders, and nine (14.2%) to control termites. A total percent is not provided since some respondents named more than one pest. Other responses included crickets, snails/ slugs and beetles.

Table 14

Use of Pest Control Products	Frequency	Percent
Ants	42	66.6%
Spiders	13	20.6%
Termites	9	14.2%
Rats or mice	6	9.5%
Fleas	4	6.3%
Wasps, bees, or stinging insects	3	4.7%
Cockroaches	2	3.1%
Other	5	7.9%

Why did you Hire a Professional Pest Control Company?

One respondent did not provide a response as to why he/she hired a professional pest control company. As depicted in Table 15 below, of the 67 valid responses, 29 (43.2%) replied that they hired a professional company for "convenience", followed closely by 23 (34.3%) that hired a professional company because the company had "expertise" combating pest problems. The categories listed in Table 15 were developed on the basis of responses; they were not read to survey respondents. Responses categorized as "other" included "recommendation from someone", "I don't have time to do it myself", and "You can't kill termites on your own." A total percent is not provided since respondents could provide more than one reason for hiring a professional company.

Table 15

Reason for hiring	Frequency	Percent
Convenience	29	43.2%
Expertise	23	34.3%
Seriousness of problem	17	25.3%
Safety	10	14.9%
A guarantee is provided	8	11.9%
Application by self failed	4	5.9%
Other	4	5.9%

Where the Professional Company Applies Pesticides

Sixty-five of the 68 respondents that use a professional company were able to indicate where pesticides are applied at their residence. As shown in Table 16 on the next page, the overwhelming majority (93.8%) of respondents indicated that pesticides are applied to hard surfaces, like building perimeters, the bases of buildings, driveways and sidewalks. Twenty-four (36.9%) respondents indicated that pesticides are applied to their lawns or turf, and nine (13.8%) reported that pesticides are applied to ornamental landscaping such as flowers, shrubs or trees. Since respondents could indicate more than one area, a total percent is not included.

Table 16

Where Products are Applied	Frequency	Percent
Hard surfaces	61	93.8%
Lawns or turf	24	36.9%
Ornamental landscaping	9	13.8%
Food plants	3	4.6%
Other	1	1.5%

What Pesticide the Company Applies

Only one of the 68 respondents was able to name the product, Dioxin, that is applied at his/her residence.

Professional Company Schedule

Of the 68 respondents that use a professional pest control company, 53 (77.9%) report that they have a contract service that involves scheduled repeat visits and 15 (22.1%) use the service as needed, or on an on-call basis.

Non-Use of Professional Pest Control Company

Why Residents Do Not Hire a Professional Pest Control Company

Respondents that indicated that either they (n=332) or another member of their household (n=30) was responsible for pesticide application were asked why they do not hire a professional pest control company. Thirty-four of these 362 respondents (9.3%) did not provide a response. As depicted in Table 17 on the following page, of the 328 valid responses, 105 (32.0%) residents indicated that their pest problems are not serious enough, 91 (27.7%) indicated that a professional company is too expensive, and 76 (3.1%) reported that they have sufficient expertise. Since respondents could reply to this open-ended question with more than one reason, a total percent is not included.

Table 17

Reason for Not Hiring a Professional	Frequency	Percent
Pest problems are not serious enough	105	32.0%
Too expensive	91	27.7%
I have sufficient expertise	76	23.1%
I can apply pest control products safely	32	9.7%
Application of products by self has been successful or works just as well	30	9.1%
Dissatisfaction with professional company	15	4.5%
Someone else takes responsibility for applying pesticides	8	2.4%
Do not like or believe in chemicals/ pesticides	7	2.1%
Other	13	3.9%

Other reasons respondents gave for not hiring a professional company were the presence of pets, babies and household members with allergies.

How People Identify Outdoor Pests

All survey respondent were read a list of response options, detailed in Table 18 below, to indicate how they identify outdoor pest problems. Ninety-six (9.3%) respondents indicated that they do not know what pest problems they have and one respondent refused to answer the question. As detailed in Table 18, 763 (82.0%) of the 930 respondents that provided answers reported that they can identify pest problems from experience, followed by 118 (12.6%) that guess, and 79 (8.4%) that identify pest problems by using a book, magazine, or the Internet. Percentages are computed based on 930 valid responses. The response options presented in Table 18 were read to survey respondents. Since respondents were free to select more than one option, a total percentage is not provided.

Table 18

Identification of Pest Problems	Frequency	Percent
Can identify them from experience	763	82.0%
Guess	118	12.6%
Identify it by book, magazine, or Internet	79	8.4%
Receive help from store personnel	67	7.2%
Other (Ask friends, relatives, or neighbors; rely on a gardener, receive a professional diagnosis)	35	3.7%

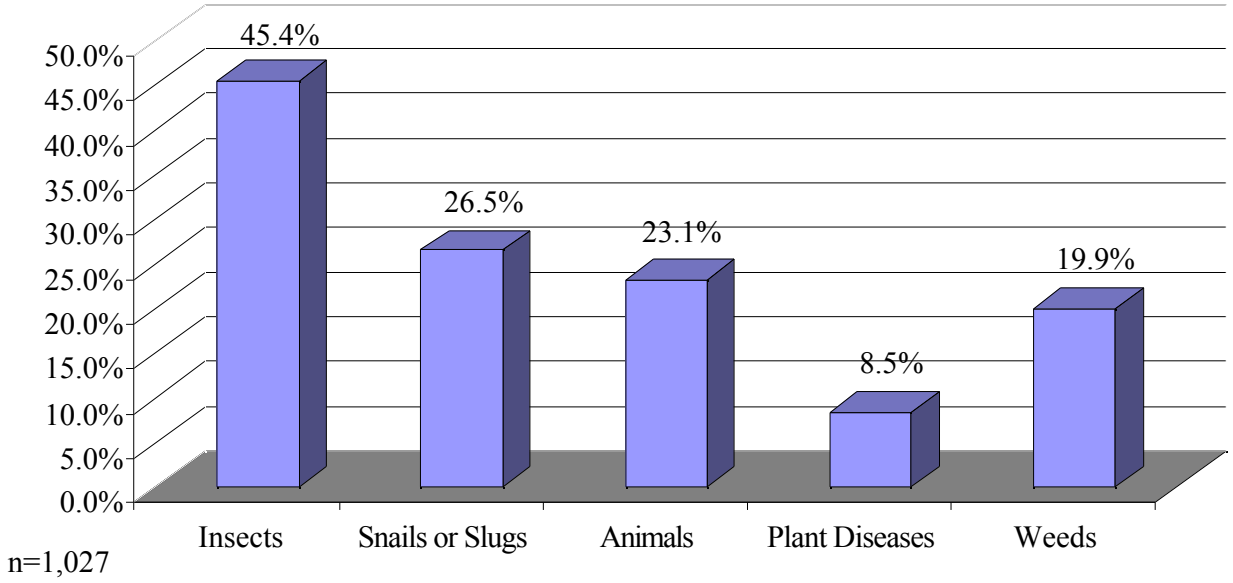
OUTDOOR PEST PROBLEMS

Outdoor Pests

Respondents were asked several questions regarding the main outdoor pests they encounter, focusing upon insects, snails and slugs, animals (such as birds, rabbits, squirrels, gophers, and deer), plant diseases, and weeds. The graph below details the proportion of respondents, out of 1,027, that indicated that insects, snails or slugs, animals, plant diseases, and/or weeds are a major problem around their residence. Detailed information for each of these general categories is detailed in the text following the graph.

As depicted by the graph below, 467 of the 1,027 (45.4%) respondents reported insects to be a major outdoor problem, followed by 273 (26.5%) that identified snails and slugs, 238 (23.1%) that indicated animals, and 205 (19.9%) that indicated weeds. The lowest proportion of respondents (8.5%) reported that plant diseases are a "major outdoor problem".

Proportion of Respondents Reporting Major Types of Outdoor Pest Problems



In the sequence of questions pertaining to outdoor pest problems, multiple pests may have been specified, so percentages do not sum to 100. In the following sections, percentages are computed based upon the number of valid responses only.

Insects

Eleven respondents did not know if they had an insect problem around their residence. Of the remaining 1,016 residents, 549 (54.0%) do not consider insects to be a major outdoor problem and 467 (46.0%) do. Of the 467 residents that identified insects as a problem, close to

three-quarters (n=345, 73.8%) indicated that they had a problem with ants, 154 (32.9%) named spiders, 46 (9.8%) flies, 25 (5.3%) cockroaches, 21 (4.4%) mosquitoes, 20 (4.2%) termites, and 19 (4.0%) named fleas. Other responses included wasps, bees, whiteflies, aphids, yellow jackets and silverfish.

Snails and Slugs

Of the 1,017 valid responses, 273 respondents (26.8%) indicated that they considered either snails or slugs to be a major outdoor problem, while 744 (73.2%) do not. Ten respondents did not provide an answer.

Animals

On this item, 1,019 of the 1,027 respondents were able to provide a response. Of these, 238 (23.4%) indicated that they had a problem with animals. The largest proportion (n=109, 45.7%) indicated that they had a problem with rodents, such as mice and rats, 77 (32.3%) named birds, 76 (31.9%) squirrels, and 24 (10.0%) indicated that they considered raccoons to be a major outdoor pest problem. Other responses included gophers and moles, skunks, and opossums.

Plant Diseases

Of the 1,001 valid responses, only 88 respondents (8.8%) indicated that plant diseases are a major outdoor problem. Of these 88 respondents, 21 (23.8%) listed mildew as a plant disease, 17 (19.3%) identified black spots, and 11 (12.5%) misidentified aphids as a plant disease. Eight (9.0%) respondents identified miscellaneous tree diseases, seven (7.9%) named fungus, and seven (7.9%) named Peach Leaf Curl. Other responses included mold, dieback and scale. Four respondents (4.5%) were unable to identify the plant disease that they considered to be a major outdoor problem.

Weeds

Of the 1,013 respondents able to answer this question, 205 (20.2%) indicated that weeds are a major outdoor problem, 808 (79.8%) said they were not. The majority of respondents (n=62, 30.2%) were unable to identify the type of weed or grass they considered to be problematic. Of the 143 that could identify the weed, over one-half (n=76, 53.1%) identified crab grass, 52 (36.3%) replied that Bermuda grass was a problem around their residence, and 45 (31.4%) reported a problem with Dandelions. Other responses included miscellaneous grasses (such as Dallas, Rye and Nut grass), clover, and spurge.

Outdoor Pest Problems and Type and Ownership of Residence

Residence Type/ Ownership (see Table 9 on page 8) is not significantly related to whether respondents reported insects to be a major outdoor pest problem. However, Residence Type/ Ownership is significantly related to whether respondents reported snails and/or slugs, animals, plant diseases, and weeds to be a major outdoor problem. These differences are detailed in the text and tables on the following pages.

Snails and Slugs

As depicted in Table 19 below, over one-third (35.0%) of residents that own single family detached homes report snails or slugs to be a problem. Approximately one-quarter of respondents that either own attached homes (26.4%) or rent single family detached homes (26.9%) indicated that they consider snails or slugs to be a major outdoor problem. This decreases to approximately 18% (17.9%) of the residents that rent apartments and 15% of residents that rent attached homes. The relationship between Residence Type/ Ownership and the proportion reporting snails or slugs to be problematic is statistically significant.

Table 19

Residence Type/ Ownership	Proportion Reporting Snails or Slugs to be a Major Problem
Own a single family detached home	35.0%
Own an attached home	26.4%
Rent a single family detached home	26.9%
Rent an attached home	15.0%
Rent an apartment	17.9%

p. < .001

Animals

As depicted by Table 20 on the next page, almost equal proportions of residents that rent single family detached homes (29.0%) and own single family detached homes (26.9%) report animals to be a major outdoor problem. The proportion of residents that rent apartments (18.8%), that report a problem with animals is higher than the proportion that own an attached home (13.2%). In addition, there is a seven percent difference between the proportions of residents that own attached home (13.2%) and rent attached homes (20.0%). This relationship is statistically significant.

Table 20

Residence Type/ Ownership	Proportion Reporting Animals to be a Major Problem
Own a single family detached home	26.9%
Own an attached home	13.2%
Rent a single family detached home	29.0%
Rent an attached home	20.0%
Rent an apartment	18.8%

p. < .05

Plant Diseases

As shown in Table 21 below, less than 10% of respondents that rent attached homes (7.7%), rent single family detached homes (6.4%) and rent apartments (4.9%) indicated that plant diseases are a major problem around their residence.

Table 21

Residence Type/ Ownership	Proportion Reporting Plant Diseases to be a Major Problem
Own a single family detached home	11.2%
Own an attached home	13.5%
Rent a single family detached home	6.4%
Rent an attached home	7.7%
Rent an apartment	4.9%

p. < .05

Weeds

As shown in Table 22 below, the highest proportions of respondents that indicated a problem with weeds are residents that own single family detached homes (26.7%), rent single family detached homes, (23.7%) and rent attached homes (20.0%). Not surprisingly, only 7.5% of residents that rent apartments report such a problem.

Table 22

Residence Type/ Ownership	Proportion Reporting Weeds to be a Major Problem
Own a single family detached home	26.7%
Own an attached home	13.2%
Rent a single family detached home	23.7%
Rent an attached home	20.0%
Rent an apartment	7.5%

p. < .001

PEST CONTROL PRODUCT USE WITHIN THE PAST SIX MONTHS

Following a branching sequence, respondents who indicated that they (n=332) or another member of their household (n=30) apply outdoor pest control products, and respondents that share this responsibility with a contracted company (n=18), (see Table 11 on page 10), were asked a series of more detailed questions about their use and disposal of outdoor pest control products.

Of the 380 residents asked, 220 (59.0%) reported that they had used a pest control product at their residence within the past six months, 153 (41.0%) had not, and seven residents did not know. The 220 who had used a product within the past six months were asked to indicate how

many different products they had used. Of the 218 respondents who could answer the question, the majority (n=130, 59.6%) indicated that they had used only one product. Sixty-five (29.8%) had used two, 16 (7.3%) had used three, five (2.3%) had used four products, and two respondents reported having used five different products in the past six months. Thus, 218 survey respondents used a total of 338 products.

Pest Control Product Use

The 218 survey respondents who were able to identify the number of different products they had used during the past six months were asked for the name of the product, what they used the product to control, the form of the product they used, where they purchased it, and where it was applied at their residence.

Pest Control Product Name

Respondents were asked to provide the name of each different product that they had used during the past six months. If respondents named more than one product, multiple responses were tallied. The total number of products named by respondents is 338; however, the nine most frequently named products account for 90.9% of all responses. These results are depicted in Table 23 on the next page. Note that "other" is the most frequent response, followed by "unknown." Percentages are computed based upon the total of 338 products used by 218 survey respondents.

Table 23

Product Name	Frequency	Percent
Other	81	24.0%
Unknown	75	22.2%
Raid, Unknown formulation	47	13.9%
Diazinon, Unknown brand	30	8.9%
Ortho Brand, Unknown product	20	5.9%
Round-Up, Unknown product	20	5.9%
Raid, Ant and Roach Spray	14	4.1%
Snail bait (generic)	12	3.6%
Sevin 5/Dust	8	2.4%

Target of the Pest Control Product

Respondents were asked to indicate the target for each pest control product they listed. Almost one-half (47.9%) of the products used by survey respondents during the past six months were used to eliminate ants. Although use of the product for snails or slugs was the second most frequent response, only 31 (9.1%) products were used. Respondents did not know the pests targeted for twelve of the products used. Table 24 below details the seven most frequent pests targeted. Percentages are calculated based on the 338 pest control products that were mentioned, not on the number of pests named by survey respondents.

Table 24

Use of Pest Control Products	Frequency	Percent
Ants	162	47.9%
Snails or Slugs	31	9.1%
Weeds	28	8.2%
Spiders	22	6.5%
Hornets/Wasps	16	4.7%
Insects-Unspecified	15	4.4%
Rodents	14	4.1%

Product Form

Table 25 on the following page details the form for 335 of the 338 products used by survey residents during the past six months. Almost one-half (46.9%) of the products were ready-to-use sprays, 78 (23.3%) were concentrated sprays, and 46 (13.7%) were dry granules. The "other" responses were pellets, traps, and bait. Respondents were unable to provide the product form for three of the products used during the past six months.

Table 25

Product Form	Frequency	Percent
Ready-to-use spray (includes aerosols)	157	46.9%
Concentrated spray	78	23.3%
Dry granule	46	13.7%
Enclosed baits (ant stakes or plastic housings with bait inside)	25	7.5%
Dust	15	4.5%
Other	14	4.2%
Total	335	100.0%

Of the 157 respondents that used a ready-to-use spray, 103 (66.0%) reported that the spray was an aerosol can and 53 (34.0%) reported that it was a squirt bottle with a manual pump. One respondent was unable to further specify the type of ready-to-use spray.

Where Was the Product Applied?

Respondents were asked to indicate where the outdoor pest control product was applied. Of the 338 products, 214 (63.3%) were applied to hard surfaces, followed by 70 (22.1%) that were applied on lawns or turf, 66 (19.5%) on ornamental landscaping, and 34 (10.1%) products were applied to food plants. A total percent is not provided on Table 26 since respondents could indicate that the product was applied to more than one area.

Table 26

Where product was applied	Frequency	Percent
Hard surfaces	214	63.3%
Lawns or turf	70	20.7%
Ornamental landscaping	66	19.5%
Food plants	34	10.1%
Other	23	6.8%
Don't know/ No response	6	1.8%

Product Point of Sale: Store Type

As depicted in Table 27 on the next page, respondents indicted that they had purchased over one-half (51.4%) of the products at large home supply stores (such as Home Depot). The 60 (18.9%) products purchased at grocery or drug stores were a distant second, followed by 32 (10.1%) purchased at a discount department store (such as Target), 28 (8.8%) at a hardware store, 17 (5.4%) at a nursery, and 16 (5.0%) at another type of store, such as a Base Exchange (a military store) or a farm supply store. A few respondents indicated that the products had been given to them.

Table 27

Point of Pest Control Product Sale	Frequency	Percent
Large home supply store	163	51.4%
Grocery or drug store	60	18.9%
Discount department store	32	10.1%
Hardware store	28	8.8%
Nursery	17	5.4%
Other	16	5.0%
By catalog or Internet	1	.3%
Don't know	21	Omitted from total
Total	338	100.0%

Product Point of Sale: Store Name

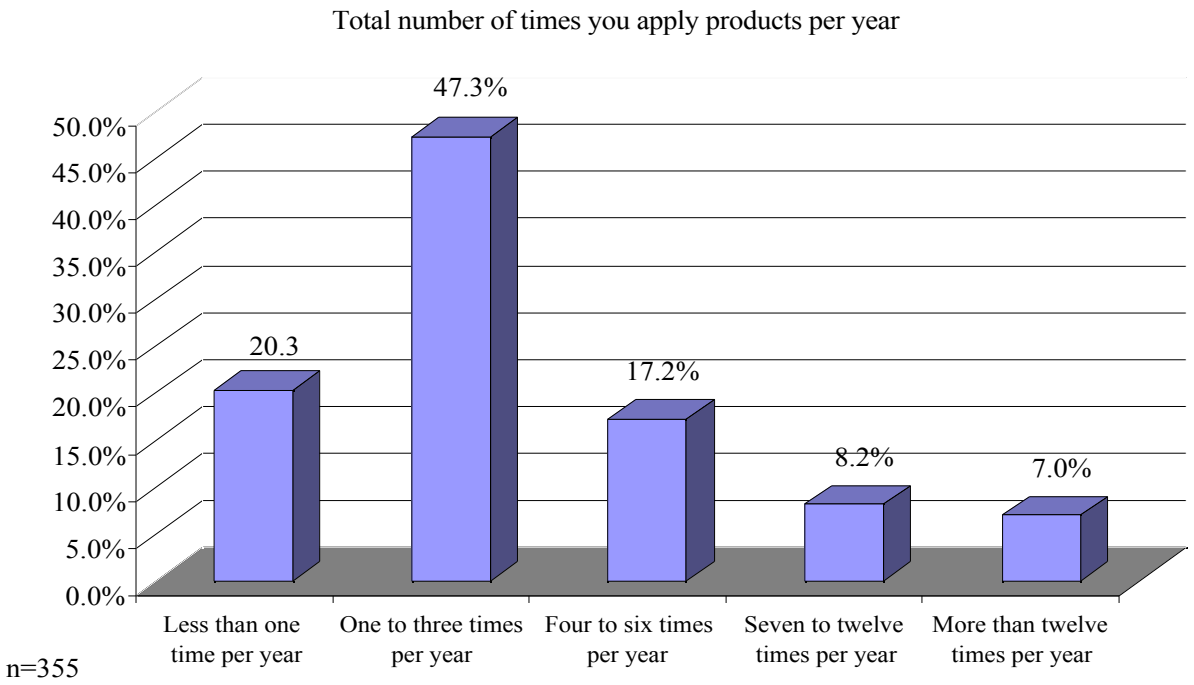
For each store type detailed in Table 27 above, respondents were asked to provide the name of the store where they made their purchase. Table 28 details the eleven most frequent responses, which account for approximately 90% of all stores identified. Almost one-half (46.1%) of the products used during the past six months had been purchased at Home Depot. Many of the store names did not occur in sufficient numbers to categorize, so the second largest proportion of the products (n=48, 15.1%) were purchased at locations categorized as "other." Also note that for twelve of the products, respondents could not name the store where their purchase was made. Respondents that were unable to provide the general type of store where the purchase was made (see Table 27 above) were not asked for the store name. Percentages in Table 28 are based on the 317 valid responses.

Table 28

Name of Store	Frequency	Percent
Home Depot	146	46.1%
Other	48	15.1%
Orchard	16	5.0%
Railey's	12	3.8%
Wal-mart	12	3.8%
Don't Remember	12	3.8%
Capital Nursery	9	2.8%
K-Mart	9	2.8%
Ace Hardware	8	2.5%
Albertson's	7	2.2%
Target	7	2.2%

How Often People Apply Pest Control Products

The 380 respondents that apply pest control products at home were asked to indicate the total number of times per year that they apply any pest control products that they use. Twenty-five respondents either refused to answer or indicated that they did not know. The graph below depicts the distribution of the 355 valid responses. Almost one-half (47.3%) of the respondents reported applying products between one and three times per year, followed by 72 (20.3%) that apply products less than one time per year. Sixty-one (17.2%) report applying products between four and six times per year, and almost equal proportions report applying products between seven and twelve times per year (8.2%) and more than twelve times per year (7.0%).



PEST CONTROL PRODUCT DISPOSAL

Disposal of Outdoor Products Mixed With Water

Respondents were asked what they did with the leftover solution for outdoor products that must be mixed with water prior to use. Of the 380 respondents asked, almost one-half (n=183, 48.2%) indicated that they do not use products that must be mixed with water and 38 (10.0%) either did not know or refused to answer to answer the question. Of the 159 that use products mixed with water and were able to provide a response, 46 (28.9%) reported that they only make enough to use and that there is no mixture left over. Similarly, 44 (27.6%) reported that they store the product for later use. Table 29 on the following page depicts all of the responses, with percentages computed based on 159 valid replies. Since respondents could provide more than one answer, a total percentage is not computed.

Table 29

Disposal of Outdoor Products Mixed with Water	Frequency	Percent
I only make enough to use; there is no leftover	46	28.9%
Store and use later	44	27.6%
Reapply to same area until used up	32	20.1%
Take to a hazardous waste disposal site	17	10.6%
Put in the trash	16	10.0%

Pour on the lawn or in another garden area	11	6.9%
Pour down the drain or toilet inside your house	8	5.0%
Apply to other areas	2	1.2%
Other	4	2.5%

Disposal of Pest Control Products No Longer Used

Respondents that apply pest control products at home were asked how they usually dispose of products that they no longer use. Responses to the open-ended question, "How do you usually dispose of pest control products that you no longer use?" were later coded for analysis.

Over one-half (51.6%) of the respondents indicated that they dispose of unused pest control products by throwing them in the trash. Just over one-quarter (25.2%) indicated that they take them to a disposal site. A number of responses were not precisely consistent with the question, for instance, 29 (8.9%) respondents indicated that they use the entire product, and 16 (4.9%) either "store" it or store it for later use. It is difficult to determine the extent to which the social desirability of a "correct" response (taking a product to a hazardous waste disposal site), and the social undesirability of an "incorrect" response (pouring leftover product in the gutter) influenced these results. However, over one-half of those surveyed admitted to throwing unused products in the trash, lending some support to the accuracy of survey responses. Forty-nine survey respondents had no response and six refused to answer the question. Percentages are computed based on the 325 valid replies. A total percent is not provided in Table 30 (next page) since respondents could indicate more than one way that they dispose of products that they no longer use.

Table 30

Disposal of Outdoor Products You No Longer Use	Frequency	Percent
Put in trash	168	51.6%
Take to hazardous waste disposal site	82	25.2%
Use it all	29	8.9%
Store or Store for late use	16	4.9%
Give away	10	3.0%
Put containers in recycling bin	6	1.8%
Pour down drain or toilet inside house	5	1.5%
Pour in the gutter or street	2	.06%
Other	15	%

Other responses included "I only make enough to use," "The city or county picks them up" and "I use it on the soil only."

Disposal of Pest Control Products No Longer Used and Respondent Demographics

The response options listed in Table 30 above were crosstabulated with several respondent demographic variables: the presence of children in the household, educational attainment, race/ ethnicity, and the combined variable of race/ ethnicity and language of interview (detailed in Table 4 on Page 5). The only statistically significant relationship observed is that the proportion of residents without children (24.8%) indicating that they take products they no longer use to a hazardous waste disposal site is higher than the proportion of residents with children (15.4%).

How Do You Choose What Pest Control Products to Use?

The 380 respondents involved with home application of pest control products were asked to specify what factors they consider when determining which products to use. The top three factors reported by respondents were "how fast it works" (32.2% of those that answered), "health and human safety" (31.4%) and "cost" (29.4%). Seventy-six (21.5%) respondents stated that pet safety is a criterion used to determine what pest control product to apply. The least important factors in the determination of what product to use were "effectiveness" and "name recognition/ popularity". All of the valid responses are presented in Table 31 on the next page. Percentages are computed based on 353 valid responses. A total percent is not included since respondents could respond to this open-ended question with multiple answers. Responses categorized as "other" in Table 31 below included aroma, amount needed, and the season.

Table 31

Choose Product Based On…	Frequency	Percentage
How fast it works	114	32.2%
Health and human safety	111	31.4%
Cost	104	29.4%
Pet safety	76	21.5%
How long it will last	62	17.5%
Active ingredient	51	14.4%
Ease of application	39	11.0%
Environmental concerns	38	10.7%
Packaging	27	7.6%
Pest name or picture on label	25	7.0%
Already have at home	22	6.2%
Recommendation from someone else	22	6.2%
Clearly written instructions	13	3.6%
Effectiveness	8	2.2%
Name recognition/ Popularity	8	2.2%
Other	11	3.1%

How Residents Choose What Pest Control Products to Use and Respondent Demographics

The response options listed in Table 31 above were crosstabulated with several demographic variables: the presence of children in the household, respondent educational attainment, race/ ethnicity, and the combined variable of race/ ethnicity and language of interview. The factors related to the presence of children in the household are "cost", "packaging" and "already have the product at home," as detailed in Table 31A below. As presented in the table, a higher proportion of residents with children reported basing their product choice on cost (35% to 22.6%) and packaging (10.5% to 5.1%). It is possible that this finding is due to respondents interpreting "packaging" to include safety devices as well as aesthetic features.

Table 31A

Choose Product Based On…		
	With Children	Without Children
Cost**	50 (35.0%)	53 (22.6%)
Packaging*	15 (10.5%)	12 (5.1%)
Already have at home*	4 (2.8%)	18 (7.7%)

* p.< .05; **p. < .01

The combined variable of respondent race/ethnicity and language of interview was significantly related to the proportion of respondents that indicated that "how fast it will work" was a factor that influenced their decision to purchase a pest control product. However, since 33.3% of the cells had expected counts less than five, the results are not presented in this report. No other demographic variables were significantly related to how residents choose what pest control product to use.

What Do People Read on a Pest Control Product Label?

The 380 survey respondents that apply pest control products at their residence were read a list of items and asked, "Which of these do you read or look at on a pest control product label before buying it?" The highest proportion (59.9%) of respondents indicated that they read or look at "the list of pests the product controls," this was followed by "safety information" (55.6%), "how to apply" (51.9%) "picture of the pest" (42.3%), and "how much to use" (40.9%). Table 32 below details the label information read by the 352 respondents that supplied an answer; again a total percent is not included since respondents could select more than one answer.

Table 32

Read or Look at on a Label	Frequency	Percent
List of pests it controls	211	59.9%
Safety information	196	55.6%
How to apply	183	51.9%
Picture of the pest	149	42.3%
How much to use	144	40.9%
What the ingredients are	126	35.7%
When to treat	116	32.9%
Disposal information	93	26.4%
Other	15	4.2%

Other responses included looking for a brand name or a familiar name, environmental concerns, and price.

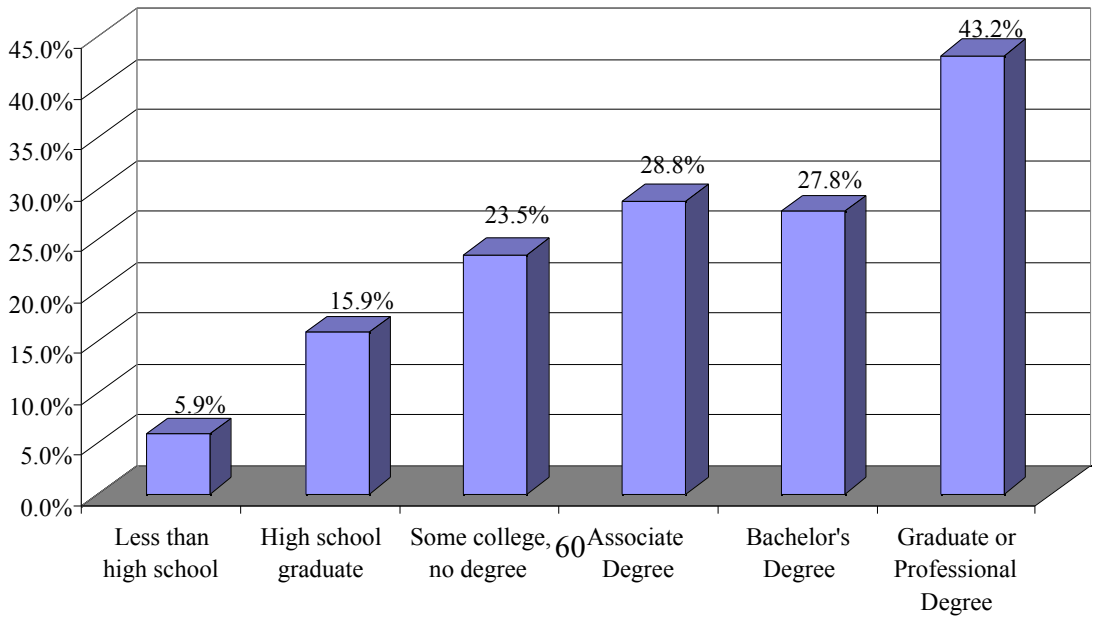
What People Read on a Pest Control Product Label and Respondent Demographics

To determine if what people read on a pest control product label is related to the presence of children in the household, educational attainment, race/ ethnicity, and the combined variable of race/ ethnicity and language of interview, these items were crosstabulated with each of the label items detailed in Table 32 above. Three of the factors in Table 32 (Disposal information, How to apply, and When to treat) were significantly related to respondents' level of education. These analyses are presented in the graphs below/ and on the following pages.

Disposal Information and Respondent Level of Education

As depicted in the graph below, overall, the proportion of residents that look at "disposal information" on a pest control product label before purchasing it increases as respondent level of

Proportion of Respondents by Educational Attainment that read or look at Disposal Information Prior to Purchase



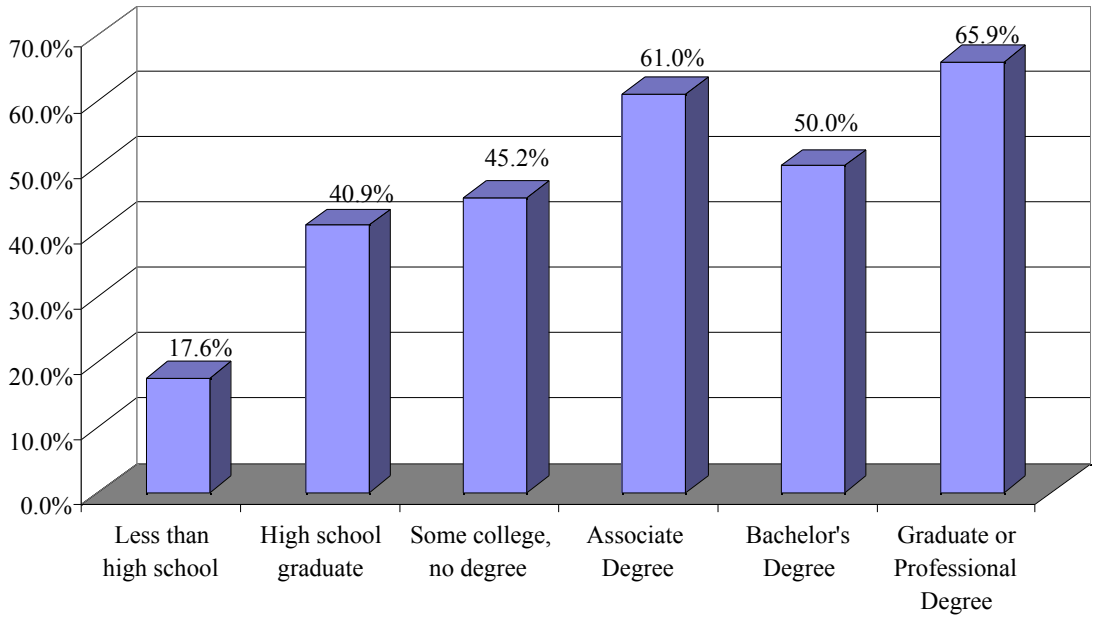
n=377

education increases. This relationship is statistically significant (_^{2}=15.89, p. < .01).

How to Apply and Respondent Level of Education

As detailed in the graph on the following page, higher proportions of residents with associate degrees (61.0%) and graduate or professional degrees (65.9%) indicated that they look at "how to apply" the pest control product on a label before purchasing it. Aside from the decrease from 61% for respondents with an AA degree to 50% of respondents with a BA or BS, the proportion of respondents that indicated that they look at how to apply a product increases with each categorical increase in respondent educational attainment. This relationship is statistically significant (_^{2}=18.09, p. < .01).

Proportion of Respondents by Educational Attainment that read or look at How to Apply prior to purchase

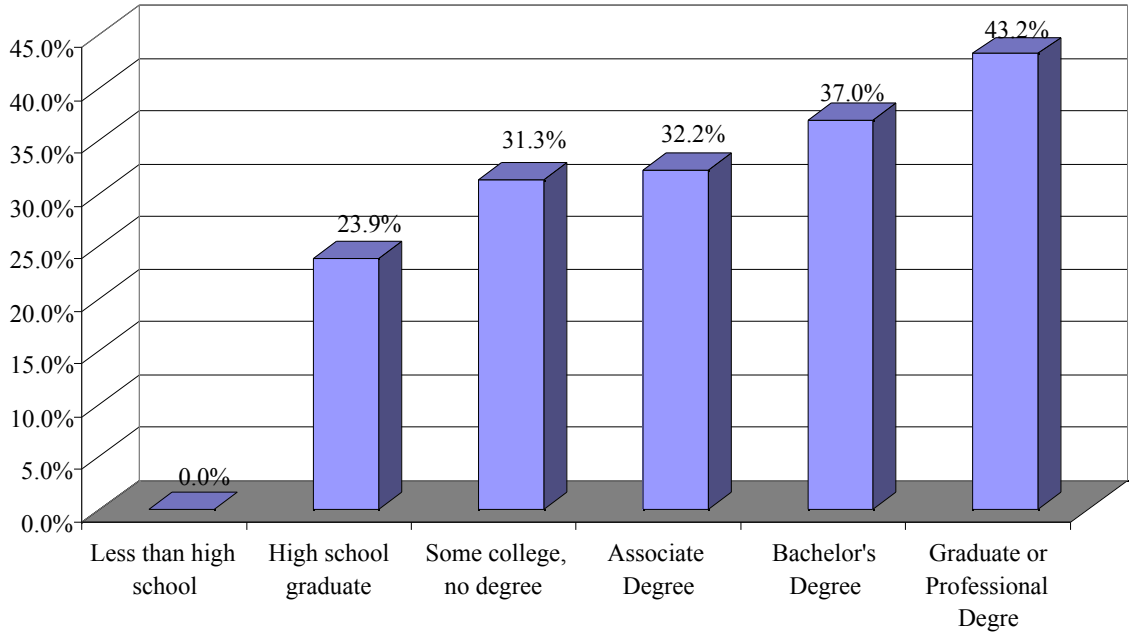


n=377

When to Treat and Respondent Level of Education

As presented in the graph on the following page, none of the respondents with less than a high school education indicated that they look at information regarding "when to treat" before they purchase a pest control product. The proportion of respondents that indicated that they look at "when to treat" information increases with each categorical increase in respondent educational attainment, although the differences are not as pronounced as in the previous analyses. The relationship is statistically significant (_^{2}=13.83, p. < .05).

Proportion of Respondents by Educational Attainment that read or look at When to Treat prior to purchase



n=377

How Do You Decide How Much of The Product to Use?

Of the 360 valid responses, almost two-thirds (63.6%) of respondents indicated that they "read and follow all directions on the container" when deciding how much of a product to use. Seventy-two (20.0%) indicated that they "read directions on the container and use them as guidelines", and 55 (15.3%) indicated that they "don't read the directions, they use experience or best estimate."

Respondents were also asked if they "measure out" or "estimate" the amount of pest control product to spray or apply. Of the 358 responses, 186 (52.0%) indicated that they measure the amount to be used, while 172 (48.0%) estimate.

What Sources of Information Influence Your Decision?

Respondents were asked to name the sources of information that influence their decision about what pest control products to buy. Respondents answered this open-ended question without prompts of any kind. As illustrated by Table 33 on the following page, the largest proportion (32.6%) indicated that they receive their pest control information by word-of-mouth. The second most frequent answer was that this information is obtained from the labels of the products that they purchase (20.5%), followed by store employees (15.8%), and advertisements (13.7%). Thirty-six respondents were unable to provide a response. The percentages below are based on 344 valid responses and a total percent is not provided since respondents could select more than one response.

Table 33

Source of information	Frequency	Percent
Word-of-mouth	124	36.0%
Product labels	78	22.6%
Employee at store where purchased	60	17.4%
Advertisements	52	15.1%
Newspaper articles	39	11.3%
Magazine articles	31	9.0%
Internet articles	23	6.6%
Posters at store where purchased	19	5.5%
Past experience	18	5.2%
Other method at the store where purchased	13	3.7%
Tear sheets at store where purchased	9	2.6%
University of California Master Gardener	6	1.7%
Garden fairs/shows	5	1.4%
Radio/ Television	5	1.4%
UC Farm Advisor	4	1.1%
Other	15	4.3%

Other responses included UC Davis Cooperative Extension, classes, and garden books or articles.

Sources of Information that Influence Your Decision and Respondent Demographics

The only respondent demographic variable significantly related to any of the sources of information listed in Table 33 above that met the criterion of fewer than 20% of cells with expected counts less than five, is the presence of children in the household. As detailed in Table 33A on the following page, 39 (27.3%) respondents with children indicated that they receive their pest control product information from product labels compared to 38 (16.2%) respondents without children under age 18 living in their homes. It seems likely that respondents with children are more concerned about potential risks of using pest control products.

Table 33A

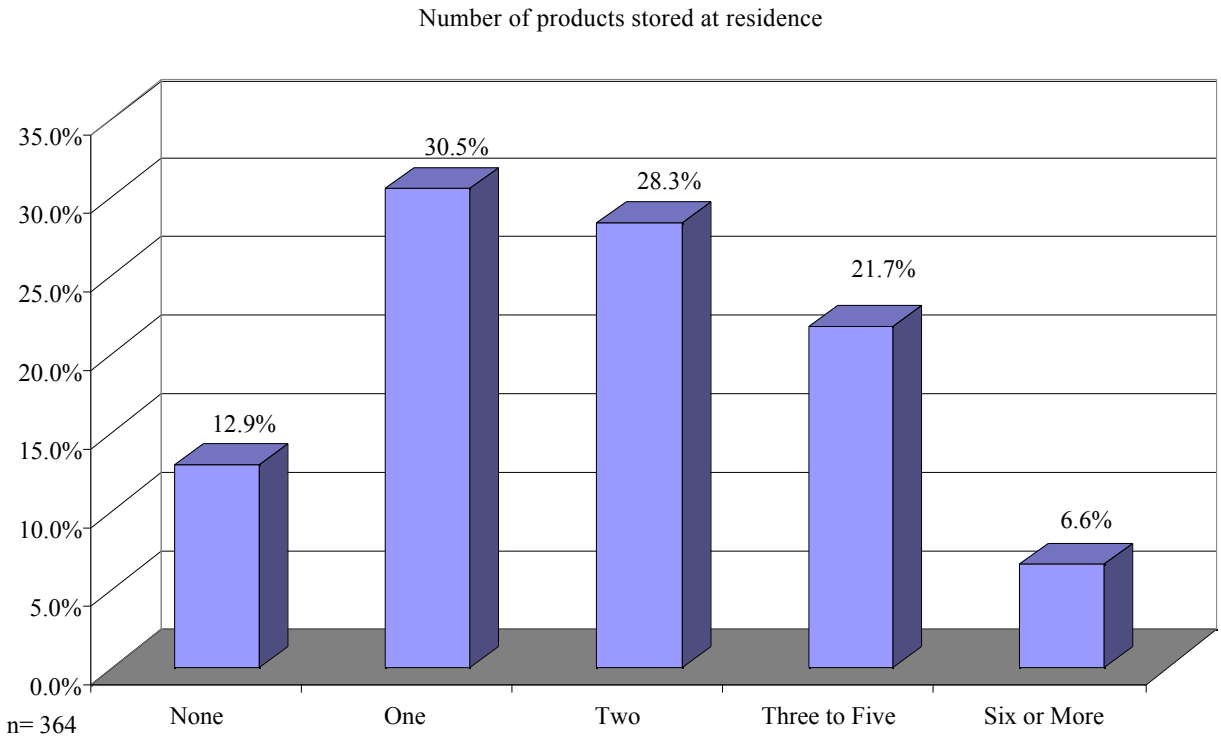
Choose Product Based On…		
	With Children	Without Children
Product labels**	39 (27.3%)	38 (16.2%)

**p. < .01

Respondent race/ ethnicity was related to "advertisements" and "classes," but 50% and 58.3%, respectively, of the cells had expected counts less than five. Respondent educational attainment was related to the proportion of respondents that indicated that "classes" are a source of information, however 50% of the cells had expected counts less than five.

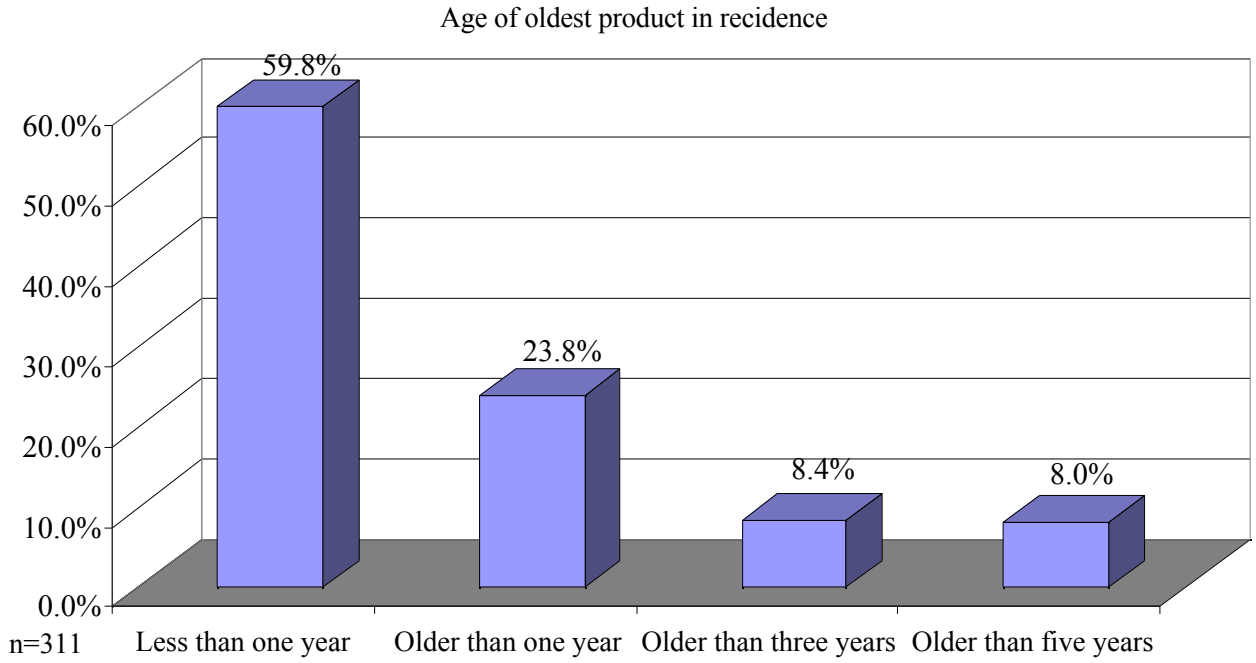
How Many Different Pest Control Products Are Stored in Your Home?

Of the 364 respondents who were able to provide an answer, 47 (12.9%) indicated that no products are currently stored in their home, 111 (30.5%) have one product stored in their home, 103 (28.3%) have two, 79 (21.7%) have between three and five and 24 (6.6%) have six or more products. The graph below depicts these results.



Age of Oldest Pest Control Product

If a respondent had at least one product in their home, they were asked to provide the age of the oldest product that they have in their residence. Six respondents were unable to specify the age of their oldest pest control product; the graph on the next page presents the information for the 311 respondents who provided a response. As detailed in the graph, close to 60% of the respondents (n=186, 59.8%) replied that the oldest product was less than one year old. Seventy-four (23.8%) reported products older than one year, 26 (8.4%) older than three years, and 25 (8.0%) older than five years.



Number of Products Stored in Your Home and Age of Oldest Product

As illustrated by Table 34 on the next page, approximately 82% of the respondents who have one product stored in their homes indicated that the oldest product was "less than one year" old. Of the respondents with two products at home, 66% reported that the oldest product is "less than one year". Of the respondents with six or more products (the last column of numbers), 50% indicated that the oldest product is older than one year and nine (37.5%) reported that the oldest product is older than five years. Reading the row of numbers labeled "older than five years," note that the proportion of respondents with a product older than five years increases from 1.8% of respondents with one product, to 4.0% of respondents with two, 13.0% of respondents with three to five and 37.5% of respondents with six or more products stored at their residence. These results are statistically significant.

Table 34 How Old is the Oldest Product Stored in your Home (row) by Number of Different Products Stored in your Home (column)

	One	Two	Three to Five	Six or More
Less than one year	90 (81.8%)	66 (66.0%)	30 (39.0%)	0
Older than one year	14 (12.7%)	22 (22.0%)	26 (33.8%)	12 (50.0%)
Older than three years	4 (3.6%)	8 (8.0%)	11 (14.3%)	3 (12.5%)
Older than five years	2 (1.8%)	4 (4.0%)	10 (13.0%)	9 (37.5%)
Total	110 (100.0%)	100 (100.0%)	77 (100.0%)	24 (100.0%)

p. < .001

Use of a Hazardous Waste Disposal Site

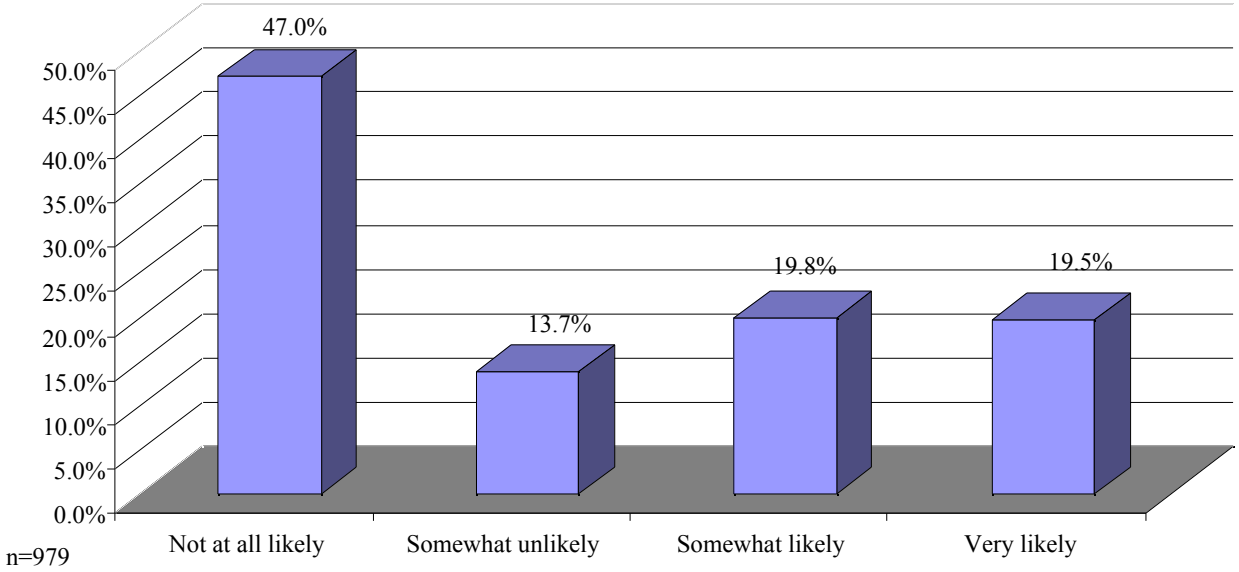
Of the 380 respondents with home application of pest control products, 145 (38.6%) replied in the affirmative when asked, "Have you or any member of your household taken materials to a household hazardous waste disposal site near you?" and 231 (61.4%) have not. Four respondents did not answer the question.

POTENTIAL USE OF ENVIRONMENTALLY-FRIENDLY PEST CONTROL COMPANY

How likely are you to Hire an Environmentally-Friendly Pest Control Company

All survey participants were asked how likely they would be to hire a pest control company or professional that uses methods that pose less risk to the environment. As depicted by the graph on the next page, almost one-half (n=460, 47.0%) of the 979 respondents that supplied an answer indicated that they would be "not at all likely." Almost equal proportions of respondents indicated that they would be "somewhat likely" (n=194, 19.8%) and "very likely" (n=191, 19.5%).

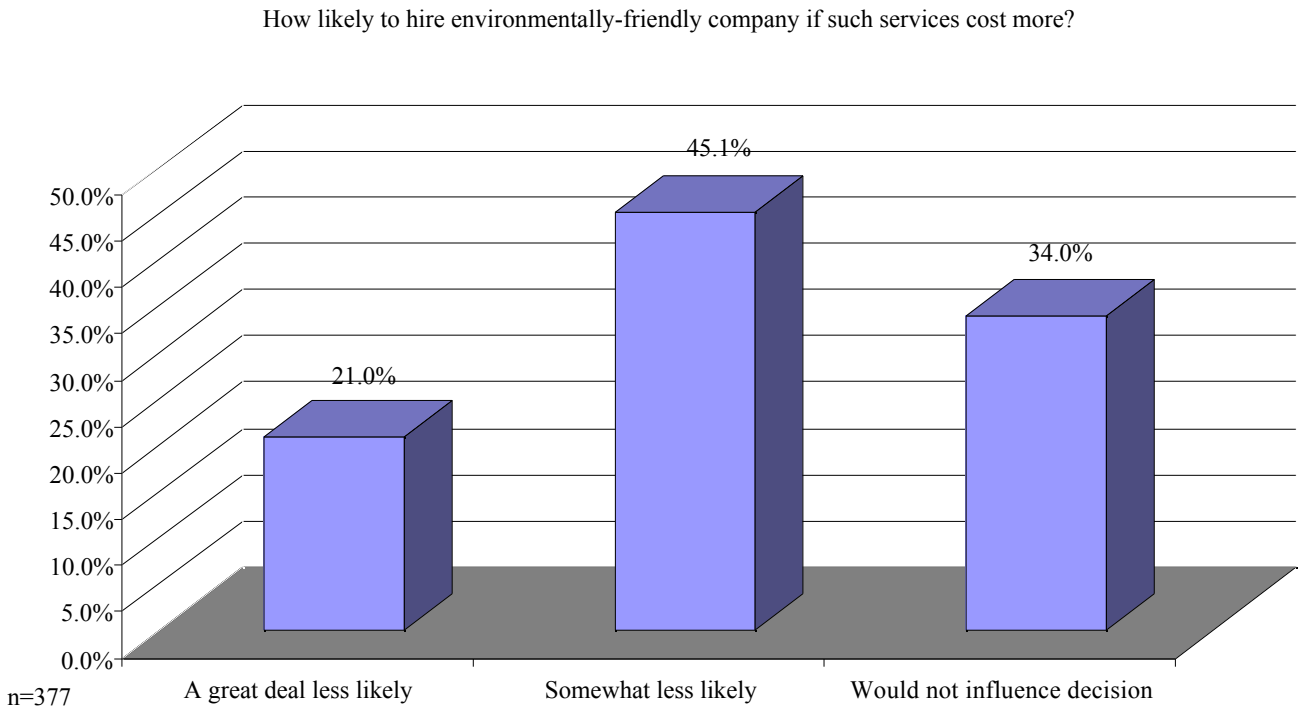
How likely is it that you would hire a pest control company or professional that offers to control pests using methods that pose less risk to the environment?



Respondents that indicated that they were either "somewhat likely" or "very likely" (n=385) to hire an environmentally-friendly company or professional were asked a series of questions to determine the extent to which the likelihood of hiring such a company was affected by factors such as cost, a slower method, and the necessity for more follow-up visits.

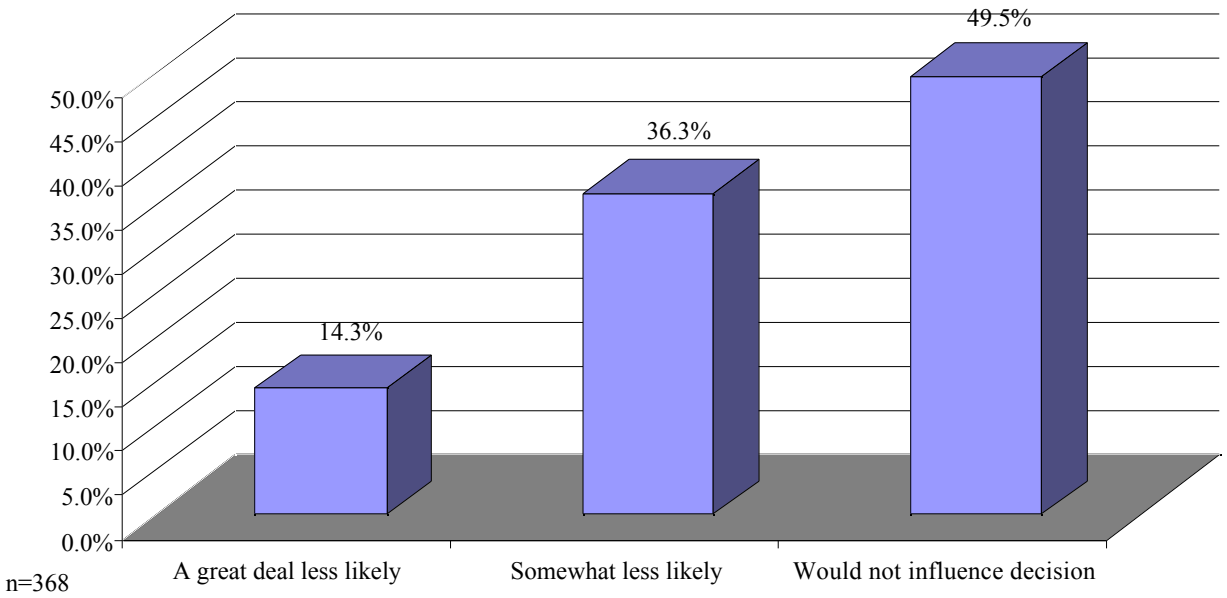
How likely if Services Cost More?

As depicted by the graph on the next page, of the 377 valid responses, the largest proportion (45.1%) of respondents reported that they would be "somewhat less likely" to hire an environmentally-friendly company or professional if the services cost more. Two-thirds (66.1%) of the respondents indicated that they were "a great deal less likely" or "somewhat less likely".



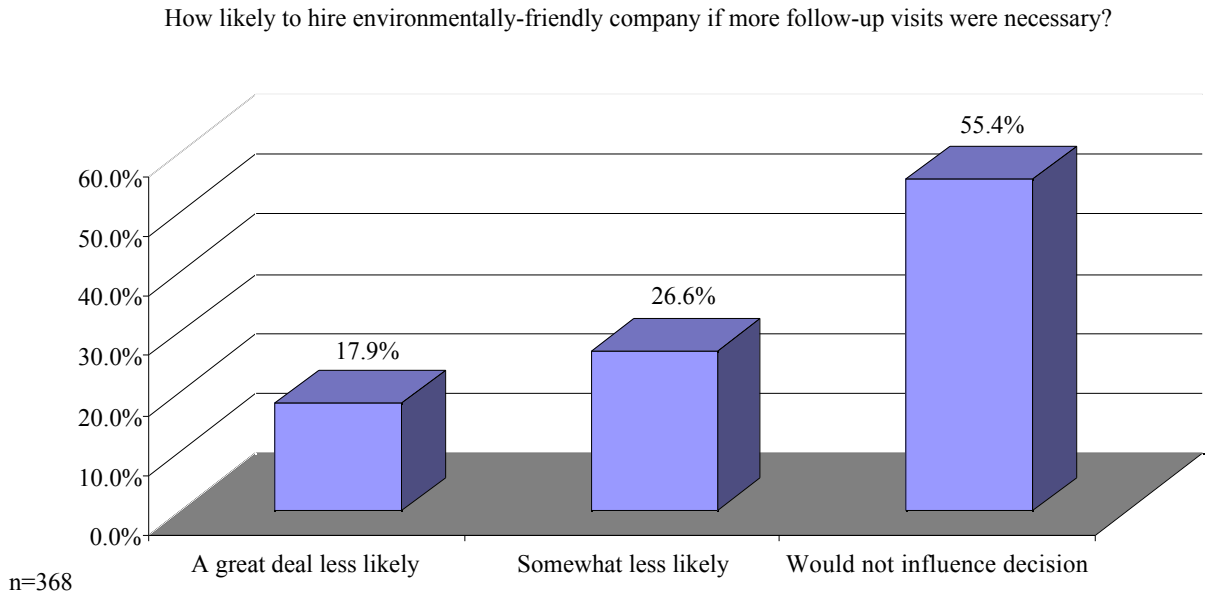
How Likely if Treatment Method was Slower?

Of the 364 valid responses, almost one-half (49.5%) of the respondents indicated that if the treatment method were slower, it would not influence their decision to hire an environmentally friendly company or professional. Only 52 (14.3%) respondents indicated that they would be "a great deal less likely" to hire such a company. These survey responses are depicted by the graph on the following page.



How Likely if More Follow-up Visits were Necessary?

As depicted in the graph below, over one-half of survey respondents (n=204, 55.4%) indicated that it would not influence their decision if more follow-up visits were necessary. However, 44.5% 368 respondents that answered the question indicated that they would be either "a great deal less likely" or "somewhat less likely" to hire an environmentally friendly company if more follow-up visits were necessary.

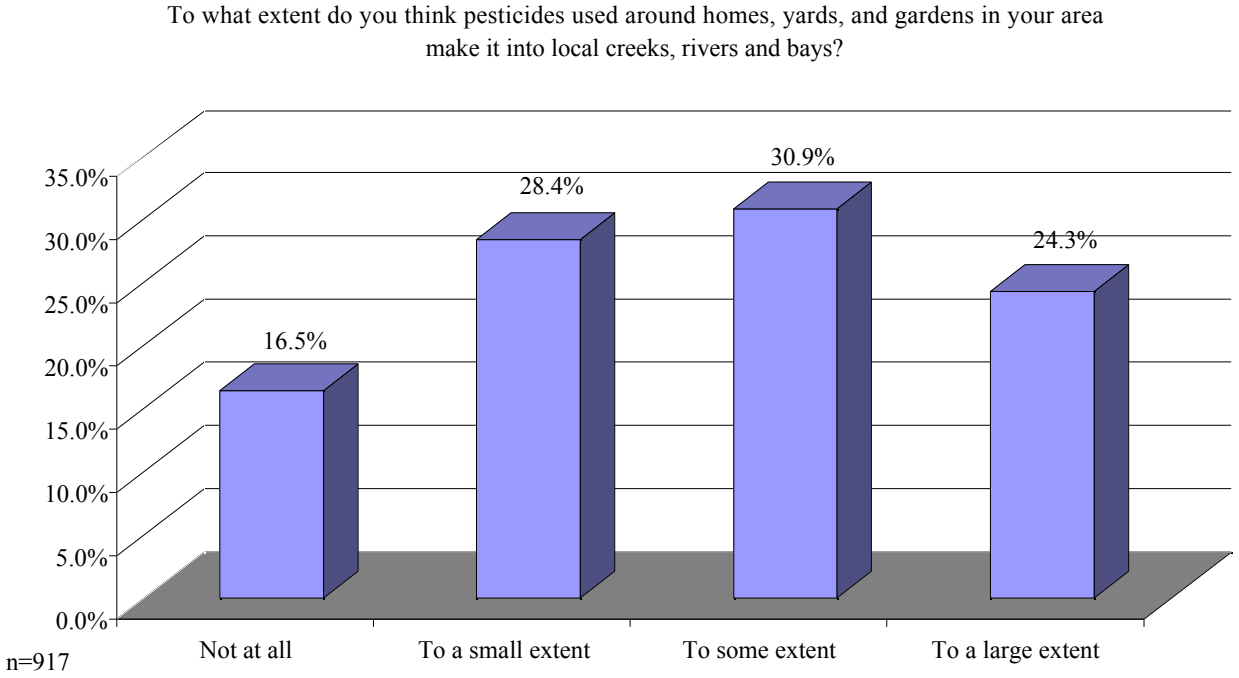


PESTICIDES AND WATER QUALITY

All survey respondents were asked several questions regarding their beliefs about the relationship between pesticide use and water quality, and their knowledge of public service advertisements regarding these issues.

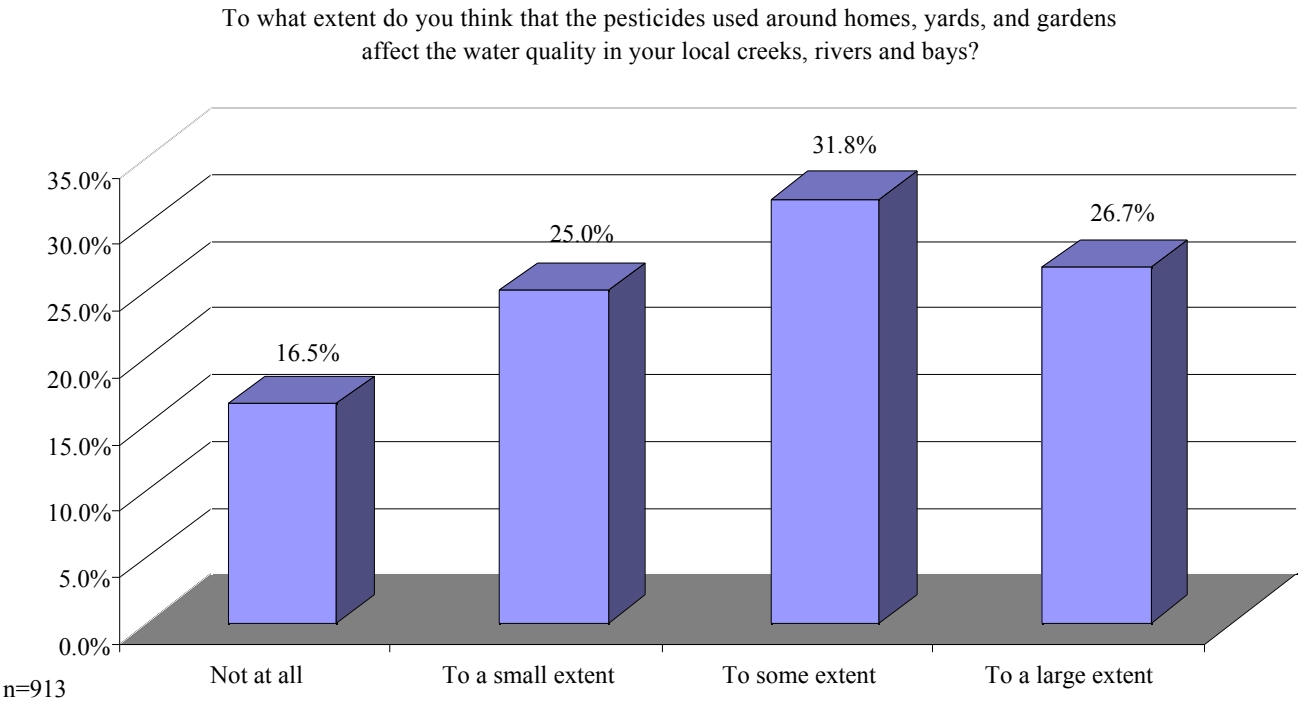
Extent to Which Pesticides Make it Into Local Creeks, Rivers and Bays

As detailed in the graph below, 151 (16.5%) survey respondents replied "not at all" when they were asked to indicate the extent to which pesticides used around homes, yards, and gardens make it into local creeks, rivers, and bays. Of the 917 valid replies, almost equal proportions indicated "to a small extent" (n=260, 28.4%) and "to some extent" (n=283, 30.9%). Almost one-quarter (24.3%) indicated "to a large extent." One hundred and nine respondents (10.6% of the total sample) did not answer the question.



Extent to Which Pesticides Affect Water Quality in Local Creeks, Rivers and Bays

Similar to the question detailed above, the largest proportion (31.8%) of respondents indicated that they believed "to some extent" that pesticides used around homes, yards and gardens affect the water quality in their local creeks, rivers, and bays. The smallest proportion (again, 16.5%) indicated "not at all." All valid survey responses are detailed in the graph on the following page. Again a large proportion (n=114, 11.1%) of the sample did not provide a response.



Awareness of Water Quality Posters, Brochures, or Billboards

Of the 1,027 survey respondents questioned, 458 (45.3%) indicated that they had heard or seen something in the media or on posters, brochures, or billboards about pesticide use and water quality within the last year or so and 552 (54.7%) had not. Seventeen respondents indicated that they did not know if they had heard or seen anything. The 458 that had seen or heard something were asked to describe what they heard or saw and also to describe the source of the information. Of these 458 respondents, 374 (81.6%) were able to describe the informational message and/or the source of the information.

Please Describe What you Heard or Saw

Over one-third of the respondents (36.4%) were unable to describe the message that they saw or heard regarding pesticide use and water quality. As presented in Table 35 on the following page, the largest proportion (12.3%) of respondents that provided answers described general messages that water runoff or dumping contaminates rivers and creeks. This was followed by 36 (9.6%) respondents that described in general terms messages related to water quality and pollution. All valid survey responses are presented in the table on the following page. Answers provided by respondents that are classified as "other" in the table were extremely varied.

Table 35

Message Regarding Pesticide Use and Water Quality	Frequency	Percent
Water runoff or dumping contaminates rivers and creeks	46	12.3%
General water quality/pollution	36	9.6%
Advertisements against pouring pesticides down drains or street gutters	29	7.8%
Warnings/ Images of fish next to street gutters	23	6.1%
Chemicals/ Pesticides negatively affect water	19	5.1%
Dispose of waste properly	15	4.0%
Chemicals/ Pesticides negatively affect fish/ animals	11	2.9%
Fish commercial- unspecified	7	1.9%
Commercial with a cartoon fish that discusses pesticides contaminating water	4	1.1%
Political Campaigns	4	1.1%
Other	43	11.5%
Don't know/ No Response	136	36.4%
Total	374	100.0%

Source of this Information

Respondents were asked for the source of the message regarding pesticide use and water quality regardless of their ability to describe the message that they had heard or seen. As detailed in Table 36 on the following page, 96 (26.2%) respondents indicated that they saw a message related to pesticides and water quality on television. This was followed by 31 (8.3%) that saw information on signs posted around their community, and by 28 (7.5%) that read or saw such a message in a newspaper. Seventy-one respondents were unable to recall the source of the information.

Table 36

Information Source	Frequency	Percent
Television	96	26.2%
Signs around the community	31	8.3%
Newspaper	28	7.5%
News – Unspecified	27	7.2%
Pamphlets and fliers sent in mail	20	5.3%
Commercials/ Advertisements – Unspecified	20	5.3%
Billboard	16	4.3%
Radio	9	2.4%
Magazine	7	1.9%
Other	47	12.6%
Don't know/No response	71	19.0%
Total	374	100.0%

Have you done anything differently in response to this information?

Of the 458 respondents asked, approximately one-quarter (n=113, 25.1%) indicated that have done something in response to the information, 338 (74.9%) have not. Seven respondents did not answer the question. Table 37 below details the responses for the 113 respondents that took action in response to the information that they saw or heard. As shown in the table below, the largest proportion (15.9%) of respondents indicated that they cut back on their use of pesticides. Eleven respondents (9.7%) each indicated that they do not use pesticides, that they are more cautious about the application and disposal of pesticides, and that they are more cautious about what pesticides they purchase. All valid responses are detailed in the Table below.

Table 37

Specify change made in response to information	Frequency	Percent
Cut back on use of pesticides	18	15.9%
Do not use pesticides	11	9.7%
More cautious/careful about application/disposal of pesticides	11	9.7%
More cautious/careful about purchase of pesticides	11	9.7%
Do not dump harmful chemicals in street or drain	7	6.2%
More careful about drinking water	6	5.3%
Informed others	4	3.5%
Use manure or environmentally safe fertilizer	2	1.8%
Do not allow water to drip or run	2	1.8%
Took political or community action	2	1.8%
Other	13	11.5%
Total	113	100%

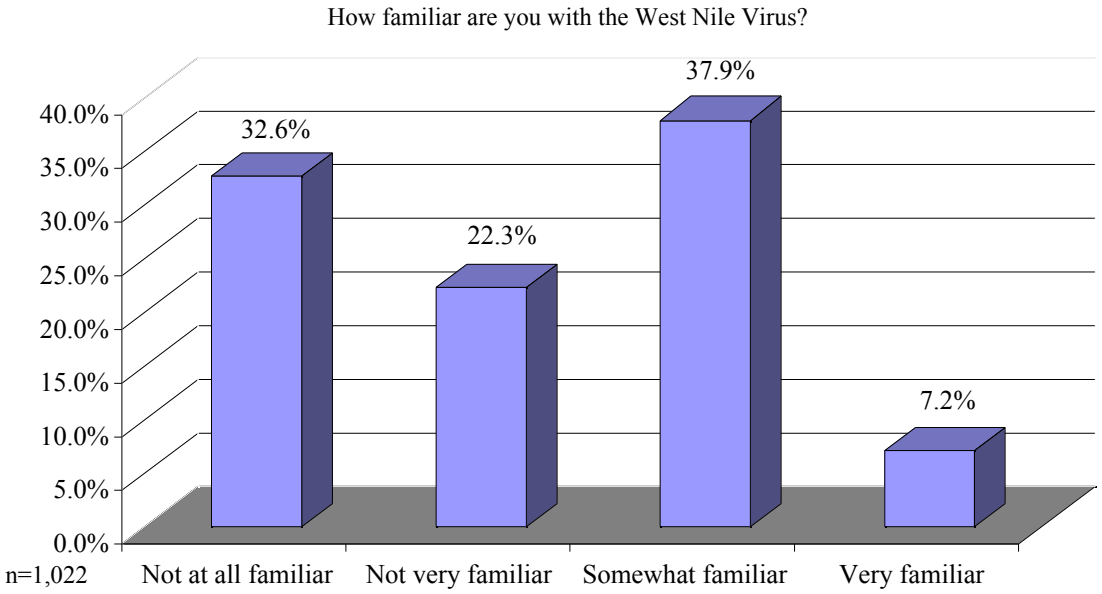
Other responses included, "I pay closer attention to my neighbors' use and disposal of pesticides", "I ask questions of the people that are responsible for applying pesticides", I buy

organic produce", "I do not leaving standing water around my residence to cut back on mosquitoes", and "I don't use drycleaners".

WEST NILE VIRUS

Familiarity with the West Nile Virus

Survey respondents were asked about their familiarity with the West Nile Virus. As depicted in the graph below, almost one-third (32.6%) of those surveyed indicated that they were "not at all familiar" with the West Nile Virus. Only 74 (7.2%) of the 1,022 respondents that answered the question indicated that they were "very familiar."



Impact of the West Nile Virus

Respondents that indicated that were "not very familiar," "somewhat familiar" or "very familiar" with the West Nile Virus were asked if they had changed their use of outdoor pest control products in the past six months because of the virus. Of the 674 valid responses, only 10 (1.5%) residents indicated that they changed their use of outdoor pest control products. Five of these respondents indicated that they bought and used mosquito repellent, two respondents began using Citronella candles, and one purchased mosquito coils. Two of the ten respondents did not specify the changes that were made.

Chapter 4: Stockton/Five Mile Slough Watershed Survey

METHOD

Development of the Survey Instrument

As described in Chapter 2, we adapted a survey instrument used in the 2000 Orange County urban pesticide use study developed by Cheryl Wilen, Area IPM Advisor, UC Statewide IPM Program in consultation with various pest management experts and survey specialists at the Social Science Research Center at California State University, Fullerton. For the 2002-03 northern California surveys, this survey was reviewed and revised under the direction of Mary Louise Flint based on input from representatives of the California Department of Pesticide Regulation, the San Francisco Bay Area and the Central Valley Regional Water Quality Control Board who served as a technical advisory committee. Questions were added to further elucidate understanding of water quality issues, disposal practices, issues related to hiring pest control firms and willingness to hire professionals who implement more environmentally sound practices. Copies of the survey questions are included in Appendix A. The same survey was used in the Sacramento/Arcade Creek watershed.

Telephone surveys

During the Fall of 2002, telephone interviews were conducted by staff of the Social Science Research Center, CSU Fullerton conducted telephone interviews with 602 persons in randomly selected households located within the boundaries of the Five Mile Slough watershed in the Stockton area. A total of 578 interviews were completed in English and 24 in Spanish or in a mix of Spanish and English. Telephone interviews were conducted from the SSRC's survey research laboratory, utilizing Computer Assisted Telephone Interviewing (CATI) equipment and software. The CATI system is a sophisticated information gathering protocol that contributes to the accuracy of data and to preserving the random nature of the sample.

Telephone interviews were conducted between September 26th and December 2nd, 2002, Monday through Thursday from 4-9 p.m.; and Saturday and Sunday from 2:00 p.m. to 8:00 p.m. The questionnaire consisted of approximately 70 items and required from two to twenty-nine minutes to complete. The average survey administration time depends upon whether pest control products are used in a household, and if so, who applies them. Respondents in household where no outdoor pest control products are applied required an average of seven minutes and 16 seconds to complete the survey. When an external company applied pest control products, the survey required an average of eight minutes. Respondents that applied products themselves or shared this responsibility with an external company required an averaged time of twelve minutes and 44 seconds to complete the survey.

The survey sample was developed in consultation with Scientific Telephone Samples (STS), a proprietary firm specializing in the production of Random Digit Dial (RDD) telephone samples. The sample was constructed in proportion to the number of households within the two ZIP codes falling within the watershed boundary. When zip code alone was not sufficient to determine whether a potential respondent resided within the watershed, extensive screening was undertaken (see Appendix A to review the survey instrument and the script for this process).

When it was not possible to establish that a potential respondent resided within the watershed boundary, she or he was excluded from the study.

The sample frame consisted of both listed and unlisted, old and recently established telephone numbers of all households within the designated watersheds. Therefore, every household in this area with a telephone had an equal non-zero chance of being selected to participate in the study. It is estimated that the penetration of phone lines in residential households in California is over 95%. The precise proportion of households in the Five Mile Slough watershed with telephones is unknown. It is our belief that no major events occurred during the interview period that might have affected responses to the survey items.

To complete 602 interviews, 37,518 individual dialing attempts were made. About 25% (24.7%) of the interviews were completed on the first attempt, 14.1% on the second, 12.1% on the third attempt, 9.3% on the fourth call, and 39.8% on the fifth or higher attempt. This persistence paid off in a response rate of 68.13%; an excellent outcome for an RDD study of this length. The final disposition of each unique telephone number attempted is depicted in Table 1 below.

Table 1

Final Dispositions for Sample Records	
Completes	602
No Answer	534
Busy	68
Answering Machine/ Voice Mail	308
Phone Disconnect	727
Fax Machine	351
Incoherent	90
Not a Residence	395
Spanish Language	1
Other Language	130
Teenager Phone	20
Qualified Refusal	35
Unqualified Refusal	263
Qualified Callback	70
Unqualified Callback	85
Complete Came Back	5
Not Qualified	1,288
Not Available Project Dates/ Hours	9
Call Blocked	6
Unsure if Residence is in Watershed	40
Quota Cell Full	127
Total Sample	**5,154**

Pearson Chi-Square Analyses

Throughout this report, the Pearson chi-square test is performed to examine the relationship between two categorical variables (e.g. respondent level of education and the manner in which pest control products are disposed). A statistically significant chi-square, with alpha set at $p < .05$ indicates that the observed relationship is likely to occur by chance or sampling error *less than one in twenty times*. An alpha value of .01 denotes that the observed relationship is likely to occur by chance *less than one in one hundred times.*

Optimum use of the Pearson Chi-Square Test (_^{2}) requires that no more than 20% of the cells in the crosstabulation table have expected cell counts less that five. If this assumption is not met, even when the observed relationship appears to be strong, it must be interpreted with caution. Consequently, only analyses that meet expected cell count criteria (greater than five) are presented.

RESULTS

Respondent Demographics

Gender

At the conclusion of each survey, interviewers coded respondent gender. Of the 602 completed interviews, 346 (57.5%) were conducted with females and 256 (42.5%) with males.

Age

Respondents ranged in age from 18 to 95, with an average age of 45.57 years. In this distribution, two values share the greatest frequency of occurrence (the mode); twenty respondents reported their age to be 40 and twenty respondents reported their age to be 50. As depicted in the table below, the highest proportion (28.1%) of respondents are 61 and older, followed by 134 (22.3%) between 31 and 40. The smallest proportion (13.1%) of respondents is aged 51 to 60.

Table 2

Age	Frequency	Percent
18 to 30	118	19.6%
31 to 40	134	22.3%
41 to 50	102	16.9%
51 to 60	79	13.1%
61 and older	169	28.1%
Total	602	100.0%

Presence of Children in Residence

Six respondents refused to indicate if they have children younger than 18 currently living in their residence. Of the 596 valid responses, 245 (40.7%) do have children living with them and 351 (58.3%) do not.

Race/Ethnicity

As depicted by Table 3 below, the largest racial/ethnic group is Caucasian/ White (59.5%), with Hispanics/ Latinos comprising the second largest ethnic group (20.4%). Nineteen of the 602 respondents (3.2%) refused to disclose their racial/ethnic background.

Survey respondents who self-identified as Asian were asked to specify their race. The largest number of Asian respondents, (n=18, 33.3%), indicated that they were Filipino, eight (14.8%) are Chinese, five (9.3%) Cambodian, and five (9.3%) Asian Indian. Responses also included Japanese, Korean, Vietnamese, and Pacific Islander. Four respondents did not specify further.

Six of the eight respondents (75.0%) did not provide information regarding their race/ ethnicity beyond the general category of "other". The two that specified self-identified as "Native American" and "Middle Eastern".

Table 3

Race/Ethnicity	Frequency	Percent
Asian	54	9.3%
Black or African American	41	7.0%
Hispanic or Latino	119	20.4%
Caucasian or White	347	59.6%
Bi- or Multi-Racial	13	2.2%
Other	8	1.4%
Declined to state	20	Omitted from total
Total	602	100.0%

Primary Language Spoken at Home

The overwhelming majority (92.7%) of respondents indicated that the primary language spoken in their home was English. Thirty-eight (6.3%) respondents report speaking Spanish in their home. Other responses included Tagalog, Cambodian, and West European languages, such as French.

Ten respondents report speaking English and Spanish equally at home, and five respondents speak English and another language, such as Tagalog, Cambodian or a West European language.

Race/Ethnicity and Primary Language of Interview

Respondent race/ ethnicity and language of interview were combined to form a single variable to examine differences between English speaking Latino, Spanish speaking Latino, and all other English speaking respondents. Recall that interviews were conducted only in English and Spanish. Table 4 on the next page details this new variable. Respondents that were classified as "other" race/ethnicity, or did not provide this information, are excluded. As depicted in the table, the largest proportion (79.1%) of respondents are English-speaking non-Latino respondents.

Of the 119 Latino respondents in this sample, 98 (82.3%) completed the survey in English and 21 (17.6%) completed the survey in Spanish.

Table 4

Race/ Ethnicity and Language of Interview	Frequency	Percent
English Speaking Latino	98	16.8%
Spanish Speaking Latino	21	4.1%
English Speaking all Others	461	79.1%
Total	583	100.0%

City of Residence

As indicated by Table 5 below, 94% of the sample reside in Stockton. Just fifteen (2.5%) respondents currently live in Sacramento and fewer than ten respondents live in each of the other cities. During survey administration, eight (1.4%) of the 602 respondents refused to disclose their city of residence. City information for these residents was obtained by using their residential Zip Code, which they provided during the initial screening process.

Table 5

City of Residence	Frequency	Percent
Stockton	566	94.0%
Sacramento	15	2.5%
Fair Oaks	6	1.0%
Carmichael	4	0.7%
Orangeville	4	0.7%
Citrus Heights	4	0.7%
North Highlands	3	0.5%
Total	602	100.0%

Total Annual Household Income

Of the 602 survey respondents, 177 (29.4%) either did not know or declined to state their total annual household income, thus percentages in Table 6 on the following page are computed based on 425 responses. Although income is well distributed across income categories, the proportion of respondents reporting annual incomes between $20,000 and $49,999 (14.6%), $30,000 and $39,9990 (16.0%) and $40,000 and $49,999 (16.2%) represents approximately 47% of the total sample.

Table 6

Total Annual Household Income	Frequency	Percent
Less than $20,000	41	9.6%
Between $20,000 and $29,999	62	14.6%
Between $30,000 and $39, 999	68	16.0%
Between $40,000 and $49, 999	69	16.2%
Between $50,000 and $59,000	41	9.6%
Between $60,000 and $69,000	42	9.9%
Between $70,000 and $79,999	24	5.6%
Between $80,000 and $89,999	11	2.6%
Between $90,000 and $99,999	10	2.4%
Between $100,000 and $124,999	23	5.4%
Between $125,000 and $149,999	11	2.6%
Between $150,000 and $174,999	6	1.4%
More than $175,000	17	4.0%
Total	425	100.0%

Level of Education

As depicted in Table 7 on the next page, by a small margin, the largest proportion (28.1%) of the 587 survey respondents that supplied an answer report having completed some college, but do not have a degree. Close to 24% (23.5%) report having a high school diploma or GED, followed by 116 (19.8%) that have a Bachelor's degree. As shown in Table 7, only 29 (4.9%) respondents report having less than a high school diploma or GED. Note that education and total annual household income (see Table 6 above) are associated with housing type, and quotas established for multiple-unit attached housing (see next page) have resulted in the over-representation of such households in the final data set. Therefore, the distributions of total annual household income and educational attainment in the survey sample do not accurately represent the entire population of the Five Mile Slough Watershed. Both income and level of education are skewed toward the low end (less education and lower annual household income) as a result of the over-representation of apartment and attached home dwellers in this sample.

Table 7

Highest Level of Education	Frequency	Percent
Less than high school diploma/GED	29	4.9%
High school diploma/GED	138	23.5%
Some college, no degree	165	28.1%
Associate degree	63	10.7%
Bachelor's degree	116	19.8%
A degree higher than a Bachelor's	76	12.9%
Total	587	100.0%

Type of Residence

Previous studies conducted in San Diego and Orange Counties revealed that persons residing in apartments and attached homes (multi-family units) rarely assume personal responsibility for the application of pest control products at their residences. Consequently, they are unable to respond to questions regarding product use and disposal. Residents in multi-family attached units are nevertheless an important component of the population. To allocate survey resources most effectively, a quota was established to limit completed surveys from residents in attached homes, apartments, and other residential types (such as school dormitories) to 200 (the final count in this quota is 201). In contrast, 401 completions were obtained from residents in single-family detached homes and mobile homes.

The leftmost columns in Table 8 on the following page depict the distribution of responses prior to November 17th, when the quota on multiple-unit attached homes was imposed. This distribution is the most accurate portrait of the housing stock in the Five Mile Slough Watershed. The columns to the right in Table 8 depict the distribution of all survey respondents after the imposition of the quota. Except where noted, these data (in the right columns) are used for analytic purposes throughout the report. Because multiple-unit attached housing is actually over-represented in the final data set, variables closely associated with residential type (such as household income, city of residence and home ownership) do not accurately depict the population residing within the Five Mile Slough Area. These data are well-suited, however, to between-category comparisons.

As indicated by Table 8, just under 60% (59.0%) of the respondents that completed surveys prior to November 17th report living in single family detached homes and 117 (25.1%) reside in apartments. The final proportion of residents in single-family detached homes rose to 66.7% and the final, overall proportion of residents in apartments fell to 20.2%.

Table 8

	Interviews Completed Before November 17, 2002		All survey respondents	
Type of Residence	Frequency	Percent	Frequency	Percent
Single-family detached home	275	59.0%	399	66.7%
Attached home	72	15.5%	76	12.7%
Apartment	117	25.1%	121	20.2%
Mobile home	2	.4%	2	0.3%
Refused	4	Omitted	4	Omitted
Total	470	100.0%	602	100.0%

Home Ownership

Fourteen respondents did not reply to a question concerning ownership of their residence. Of the 588 respondents who supplied an answer, 356 (60.5%) reported that they own their residence, while 232 (39.5%) reported that they rent.

For analytic purposes, "type of residence" and "home ownership" were combined to create a new variable. Table 9 below presents this combined variable, omitting respondents who did not answer one or both of the original questions. Over one-half (55.1%) of the residents own single family detached homes, followed by 112 (19.5%) that rent apartments. The small number of respondents that reported owning or renting a mobile home, owning an apartment, or owning or renting something else were omitted from this analysis.

Table 9

House Type/ Ownership	Frequency	Percent
Own a single family detached home	316	55.1%
Own an attached home	29	5.1%
Rent a single family detached home	77	13.4%
Rent an attached home	40	7.0%
Rent an apartment	112	19.5%
Total	574	100.0%

Outdoor Pest Control

Who Applies Outdoor Pest Control Products

All survey respondents were asked, "Who at your residence applies outdoor pest control products?" As depicted in Table 10, just over 40% of survey respondents indicated that either they (37.3%) or another member of their household (3.2%) is responsible for outdoor pest control product application. One hundred and twenty (21.2%) respondents report that a commercial company, apartment complex, or homeowner's association not directly contracted by them is responsible for outdoor pesticide application. Just under one-fifth (19.3%) of the survey respondents indicated that no outdoor pest control products are applied at their residence. Thirty-seven respondents did not provide a response.

Table 10

Who applies outdoor products	Frequency	Percent
Yourself	211	37.3%
Another Member of the household	18	3.2%
Commercial Co., Apt. Complex or Home Owner's Association	120	21.2%
Yourself and a pest control company	16	2.8%
Only a pest control company	41	7.3%
Property Owner or Landlord	46	8.1%
Other	4	.7%
No outdoor pest control products are applied	109	19.3%
Total	565	100.0%

For some analyses, the "who applies" classifications above were combined into three categories: Application by others, Self application, and No application of outdoor pest control products. Respondents that indicated that a commercial company, apartment complex or homeowner's association (n=120); only a pest control company (n=41); or their property owner or landlord (n=46) applied pest control products are labeled "Application by Others". Respondents that indicated that they (n=211) or another member of their household (n=18) are responsible for pest control application are labeled "Self Application". The 109 respondents that do not apply pest control products at their residence were so categorized, as illustrated by Table 11 on the next page. The sixteen respondents that share responsibility with an outside company and the four respondents that are categorized as "other" are not included in the new variable.

Table 11

Who applies outdoor products	Frequency	Percent
Application by Others (Commercial Co., Apt. Complex, Homeowners Assoc., Contracted Company)	207	38.0%
Self Application (respondent or another member of household)	229	42.0%
No outdoor pest control products are applied	109	20.0%
Total	545	100.0%

Who Applies Products and Residence Type/ Ownership

As depicted in Table 12 below, over one-half of the respondents that own a single family detached home (51.7%) and own an attached home (53.6%) report that someone within their household applies outdoor pest control products. Over one-half of the respondents rent an attached home (54.1%) and 70% of residents that rent an apartment report that an external company is responsible for product application. The distribution of responses for residents that rent a single family detached home is more evenly distributed with 37.1% reporting self application, 33.9% reporting application by others, and 29.0% reporting that no outdoor pest control products are applied. The relationship between "Who applies pest control products" and "Residence Type/ Ownership" is statistically significant.

Table 12 Who applies outdoor pest control products (row) by Residence Type/ Ownership (column)

	Own a Single Family Detached Home	Own an Attached Home	Rent a Single Family Detached Home	Rent an Attached Home	Rent an Apartment
Application by Others	78 (26.4%)	9 (32.1%)	21 (33.9%)	20 (54.1%)	70 (70.0%)
Self Application	153 (51.7%)	15 (53.6%)	23 (37.1%)	12 (32.4%)	17 (17.0%)
No outdoor pest control products are applied	65 (22.0%)	4 (14.3%)	18 (29.9%)	5 (13.5%)	13 (13.0%)
Total	296 (100.0%)	28 (100.0%)	62 (100.0%)	37 (100.0%)	100 (100.0%)

p. < .001

Use of a Professional Pest Control Company

What Pests Prompted You to Hire a Professional Company?

Respondents that indicated that a contracted pest control company applies pest control products (n=41), and respondents that share this responsibility with an external company (n=16), were asked what pests prompted them to hire a professional company. Of the 57 respondents asked, two did not know. The 55 respondents that could identify the pest(s) that prompted them to hire a professional company named 90 pests. The percentages in Table 13 below are based on the 55 residents, not on the 90 pests that they named. As depicted in Table 13, 31 (56.4%) respondents indicated that they hired an outside pest control company to combat ants, 18 (32.7%) to control spiders, and nine (16.4%) to control termites. A total percent is not provided since many respondents named multiple pests. Responses categorized as "other" include crickets and fleas.

Table 13

Use of Pest Control Products	Frequency	Percent
Ants	31	56.4%
Spiders	18	32.7%
Termites	9	16.4%
Rats or mice	7	12.7%
Cockroaches	7	12.7%
Wasps, bees, or stinging insects	4	7.3%
Snails/Slugs	3	5.5%
Beetles	3	5.5%
Other	8	14.5%

Why did you Hire a Professional Pest Control Company?

Two respondents did not provide a response as to why they hired a professional pest control company. As depicted in Table 14 on the next page, of the 55 residents that answered the question, 20 (36.4%) responded that they hired a professional company because the company had the necessary "expertise." Seventeen (30.9%) residents wanted the "convenience" of a professional pest control company. The categories listed in Table 14 on the following page were developed based on survey responses. Residents were not read a list of options. Responses categorized as "other" in Table 14 include "recommendation from someone", and "I don't have time to do it myself." A total percent is not provided since respondents could list several reasons for hiring a professional company.

Table 14

Reason for hiring	Frequency	Percent
Expertise	20	36.4%
Convenience	17	30.9%
Seriousness of problem	13	23.6%
Safety	5	9.1%
Application by self failed	5	9.1%
A guarantee is provided	1	1.8%
Other	8	14.5%

Where the Professional Company Applies Pesticides

Fifty-five of the 57 respondents that use a professional company were able to indicate where pesticides are applied at their residence. As shown in Table 15 below, the overwhelming majority (92.7%) indicated that pesticides are applied to hard surfaces, like building perimeters, the bases of buildings, driveways and sidewalks. Eighteen (32.7%) respondents indicated that pesticides are applied to their lawns or turf, and eight (14.5%) reported that pesticides are applied to ornamental landscaping such as flowers, shrubs or trees. Since respondents could indicate more than one area, a total percent is not included.

Table 15

Where Products are Applied	Frequency	Percent
Hard surfaces	51	92.7%
Lawns or turf	18	32.7%
Ornamental landscaping	8	14.5%
Food plants	6	10.9%
Other	3	5.4%

What Pesticide the Company Applies

Only two of the 57 respondents were able to name the product that is applied at their residence; Diazinon is applied at one residence and both Dursban and Boric Acid are applied at the other.

Professional Company Schedule

Of the 57 respondents that use a professional pest control company, 46 (83.6%) report that they have a contract service that involves scheduled repeat visits and nine (16.4%) use the service as needed, or on an on-call basis. Two respondents did not answer the question; thus percentages are computed on 55 valid responses.

Non-Use of Professional Pest Control Company

Why Residents Do Not Hire a Professional Pest Control Company

Respondents that indicated that either they (n=211) or another member of their household (n=18) was responsible for pesticide application were asked why they do not hire a professional pest control company. Fifty-one of these 229 respondents did not provide a response. As depicted in Table 16 below, of the 178 valid responses, 52 (29.2%) residents indicated that their pest problems are not serious enough, 51 (28.6%) indicated that a professional company is too expensive, and 37 (20.7%) reported that they have sufficient expertise. Since respondents could reply to this open-ended question with more than one reason, a total percent is not included.

Table 16

Reason for Not Hiring	Frequency	Percent
Pest problems are not serious enough	54	30.3%
Too expensive	51	28.6%
I have sufficient expertise	37	20.7%
I can apply pest control products safely	26	14.6%
Application of products by self has been successful or works just as well	16	8.9%
Dissatisfied with professional company	6	3.3%
Do not like or believe in chemicals/ pesticides	3	1.6%
Someone else takes responsibility for applying pesticides	2	1.1%
Have pets or babies	2	1.1%
Other	4	2.2%

One respondent, whose response is categorized as “other” in the table above, replied “I do not want people in or near my house.”

How People Identify Outdoor Pests

All survey respondents were read a list of response options, detailed in Table 17 on the next page, to indicate how they identify outdoor pest problems. Sixty-two (10.2%) respondents indicated that they do not know what pest problems they have and one respondent refused to answer the question. As detailed in Table 17, 457 (84.7%) of the 539 respondents that provided answers reported that they can identify pest problems from experience, followed distantly by 58 (10.8%) that guess, and 36 (6.7%) that identify pest problems by using a book, magazine, or the Internet. Percentages are computed based on 539 valid responses. Since respondents could select more than one option, a total percentage is not provided.

Table 17

Identification of Pest Problems	Frequency	Percent
Can identify them from experience	457	84.7%
Guess	58	10.8%
Identify it by book, magazine, or Internet	36	6.7%
Receive help from store personnel	31	5.8%
Other (Ask friends, relatives, or neighbors; rely on a gardener, receive a professional diagnosis)	11	2.0%

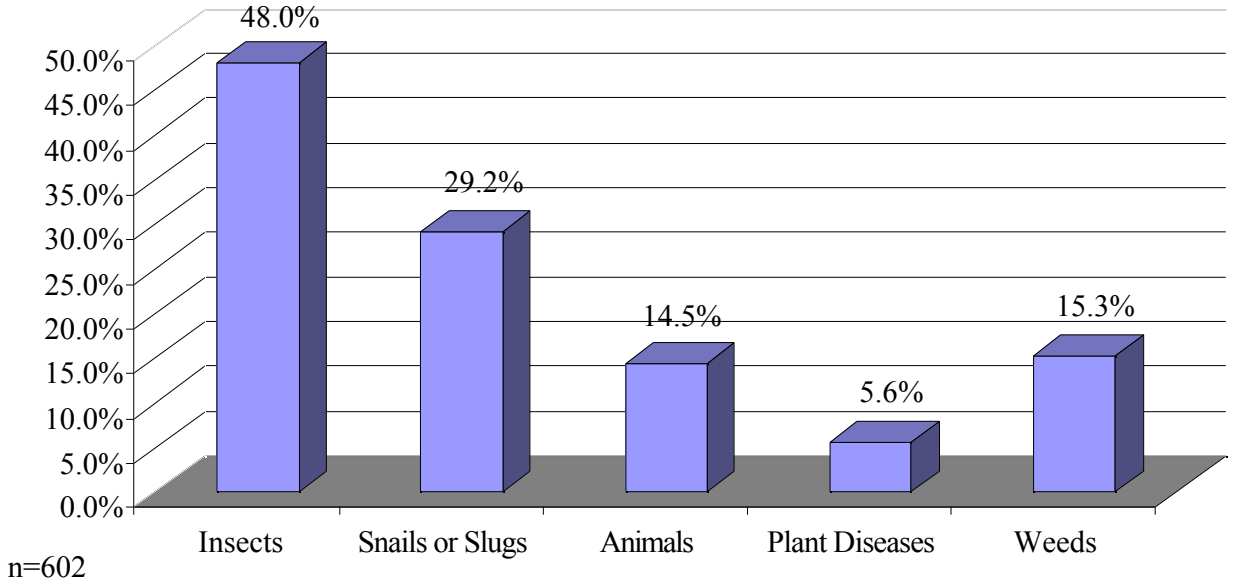
Outdoor Pest Problems

Outdoor Pests

Respondents were asked several questions regarding the main outdoor pests they encounter, focusing upon insects, snails and slugs, animals (such as birds and rodents), plant diseases, and weeds. The graph on the next page details the proportion of respondents, out of 602, that indicated that insects, snails or slugs, animals, plant diseases, and/or weeds are major problems around their residence. Information for each of these general categories is detailed in the paragraphs that follow the graph.

As depicted by the graph on the next page, close to one-half (48.0%) of the 602 respondents reported insects to be a major outdoor problem, followed by 176 (29.2%) that identified snails and slugs, 92 (15.3%) that indicated weeds, and 87 (14.5%) that indicated animals. The lowest proportion of respondents (5.6%) reported that plant diseases are a “major outdoor problem”.

Proportion of Respondents Reporting Major Types of Outdoor Pest Problems



In the sequence of questions pertaining to outdoor pest problems, beginning with "insects" below, multiple pests may have been specified, so percentages do not sum to 100. In the following sections, percentages are computed based upon the number of valid responses only.

Insects

Fourteen respondents did not know if they have an insect problem around their residence. Of the remaining 588 residents, just over one-half (n=299, 50.9%) do not consider insects to be a major outdoor problem and 289 (49.1%) do. Of the 289 residents that identified insects as a problem, close to three-quarters (n=208, 71.9%) indicated that they had a problem with ants, 105 (36.3%) named spiders, 36 (12.5%) cockroaches, 18 (6.2%) flies, 13 (4.5%) mosquitoes, 12 (4.1%) wasps, 11 (3.8%) named termites, and eight (2.7%) fleas. Other responses included bees, water bugs, aphids, beetles and whiteflies.

Snails and Slugs

Of the 598 valid responses, 176 respondents (29.4%) indicated that they considered either snails or slugs to be a major outdoor problem, while 422 (70.6%) do not. Four respondents did not provide an answer.

Vertebrates

On this item, 599 of the 602 respondents were able to provide a response. Of the 599 valid responses, 87 (14.5%) indicated that they had a problem with animals, such as birds, rabbits, squirrels, gophers, or deer. Of these 87 respondents, 49 (56.3%) indicated that they had a problem with rodents, such as mice and rats, 30 (34.4%) named birds, and 13 (14.9%) indicated that they considered raccoons to be a major outdoor pest problem. Other responses included squirrels, opossums, and skunks.

Plant Diseases

Of the 590 valid responses, only 34 respondents (5.8%) indicated that plant diseases are a major outdoor problem. Ten respondents (29.4%) listed mildew as a plant disease, four (11.7%) identified black spots, four (11.7%) miscellaneous tree diseases, and four (11.7%) misidentified aphids as a plant disease. Other responses included mistletoe, miscellaneous leaf diseases, Peach Leaf Curl, fungus, and dieback. Two respondents were unable to name the plant disease that they considered to be a major outdoor problem.

Weeds

Of the 597 respondents able to answer this question, 92 (15.4%) indicated that weeds are a major outdoor problem, 505 (84.6%) said they were not. The largest proportion of respondents (n=39, 42.4%) were unable to identify the type of weed or grass they considered to be problematic. Of the 53 that could identify the plant, 20 (37.7%) identified dandelions, 19 (35.8%) identified crab grass, and 14 (26.4%) replied that Bermuda grass was a problem around their residence. Other responses included clover, spurge, milkweed, and miscellaneous grasses (such as Dallas, Rye and Nut grass).

Outdoor Pest Problems and Type and Ownership of Residence

Residence Type/ Ownership (see Table 9 on page 8) was not significantly related to whether respondents reported plant disease and animals to be major outdoor pest problems. However, Residence Type/ Ownership was significantly related to whether respondents reported insects, snails and/or slugs, and weeds to be major outdoor problems. These differences are detailed in the text and tables on this and the next few pages.

Insects

As depicted in Table 18 on the next page, close to 60% (57.0%) of residents that <u>own single family detached homes</u> report insects to be a major outdoor problem. This is followed by 46.8% of residents that <u>rent single family detached homes</u> and 40% of residents that <u>rent attached homes</u>. Approximately one-third (33.3%) of residents that <u>rent apartments</u> report that insects are a major outdoor pest problem. The relationship between Residence Type/ Ownership and the proportion reporting insects to be problematic is statistically significant.

Table 18

Residence Type/ Ownership	Proportion Reporting Insects to be a Major Problem
Own a single family detached home	57.0%
Own an attached home	34.5%
Rent a single family detached home	46.8%
Rent an attached home	40.0%
Rent an apartment	33.0%

p. < .001

Snails and Slugs

As depicted in Table 19 below, approximately 39% of respondents who own single family detached homes indicated that they consider snails or slugs to be a major outdoor problem. The proportion of residents reporting snails/ slugs to be problematic in the other residential types is fairly close: 24.1% of residents that own attached homes, one-fifth (20.0%) of respondents that rent single family detached homes and rent attached homes, and 17.1% of residents that rent apartments. This relationship is statistically significant.

Table 19

Residence Type/ Ownership	Proportion Reporting Snails or Slugs to be a Major Problem
Own a single family detached home	38.9%
Own an attached home	24.1%
Rent a single family detached home	20.0%
Rent an attached home	20.0%
Rent an apartment	17.1%

p. < .001

Weeds

As shown in Table 20 on the next page, a higher proportion of residents that either own (21.0%) or rent (18.2%) single family detached homes report a problem with weeds. This falls to 13.8% of residents that own attached homes. Not surprisingly, only 5.1% of respondents that rent attached homes and 3.6% of respondents that rent apartments report such a problem.

Table 20

Residence Type/ Ownership	Proportion Reporting Weeds to be a Major Problem
Own a single family detached home	21.0%
Own an attached home	13.8%
Rent a single family detached home	18.2%
Rent an attached home	5.1%
Rent an apartment	3.6%

p. < .001

Pest Control Product Use Within The Past Six Months

Following a branching sequence, respondents who indicated that they (n=211) or another member of their household (n=18) apply outdoor pest control products, and respondents that share this responsibility with a contracted company (n=16), (see Table 10 on page 9), were asked a series of more detailed questions about their use and disposal of outdoor pest control products.

Of the 245 residents asked, 125 (51.0%) reported that they had used a pest control product at their residence within the past six months, 112 (45.7%) had not, and eight residents did not know. The 125 who had used a product within the past six months were asked to indicate how many different products they had used. Of the 121 respondents who could answer the question, almost two-thirds (n=79, 65.3%) indicated that they had used only one product. Twenty-eight (23.1%) had used two, eleven (9.1%) had used three, and three (2.5%) respondents reported having used four different products in the past six months. Thus, 121 survey respondents used a total of 180 products.

Pest Control Product Use

The 121 survey respondents able to identify the number of different products they had used during the past six months were asked for the name of the product, what they used the product to control, the form of the product they used, where they purchased it, and where it was applied at their residence.

Pest Control Product Name

Respondents were asked to provide the name of each different product that they had used during the past six months. If respondents named more than one product, multiple responses were tallied. The total number of products named by respondents is 180; however, the eight most frequently named products account for 87.6% of all responses. These results are depicted in Table 21 on the following page. As depicted in Table 21, the largest category is "other" followed by "unknown." Thirty-three (18.3% of the total) products were an unknown formulation of "Raid" and thirteen (7.2%) were an unspecified brand of Diazinon. Given the large proportion of respondents that report ants to be problematic, it is likely that many of the "unknown formulations of Raid" are Raid products (such as Raid Ant and Roach Spray) used to

control ants. Percentages in the table below are computed based upon the total of 180 products used by 121 survey respondents.

Table 21

Product Name	Frequency	Percent
Other	49	27.2%
Unknown	35	19.4%
Raid, Unknown formulation	33	18.3%
Diazinon, Unknown brand	13	7.2%
Raid, Ant and Roach Spray	8	4.4%
Ortho Brand, Unknown product	7	3.8%
Snail bait (generic)	7	3.8%
Ortho Home Defense	6	3.3%

Target of the Pest Control Product

Respondents were asked to indicate the target for each pest control product they named. In sum, 180 products were used to control 222 pests. As shown in Table 22 below, just over 40% (40.5%) of the products used by survey respondents during the past six months were used to eliminate ants. Use of a product for spiders was the second most frequent response, although only 24 (13.3%) products were used for this purpose. This is followed closely by 23 products (12.7%) used to control snails or slugs. Table 22 details the eight most frequent pests targeted. Percentages are calculated based on the 180 products used.

Table 22

Use of Pest Control Products	Frequency	Percent
Ants	73	40.5%
Spiders	24	13.3%
Snails or Slugs	23	12.7%
Weeds	18	10.0%
Insects-Unspecified	15	8.3%
Cockroaches	13	7.2%
Aphids	7	3.8%
Flies	6	3.3%

Product Form

Table 23 on the next page details the form for 177 of the 180 products used by survey respondents during the past six months. Just over one-half (n=91, 51.4%) of the products were ready-to-use sprays, 36 (20.3%) were concentrated sprays, 22 (12.4%) were dry granules, and twelve (6.8%) were dust. The “other” responses were pellets, a “strip of grass that already had weed killer in it when I bought it,” and non-chemical forms such as soap and water, and an electric light.

Table 23

Product Form	Frequency	Percent
Ready-to-use spray (includes aerosols)	91	51.4%
Concentrated spray	36	20.3%
Dry granule	22	12.4%
Dust	12	6.8%
Enclosed baits (ant stakes or plastic housings with bait inside)	8	4.5%
Other	8	4.5%
Total	177	100.0%

Of the 91 ready-to-use sprays, 60 (68.2%) were aerosol cans and 28 (31.8%) were squirt bottles with manual pumps. Respondents were unable to further specify the type of ready-to-use spray for three of the 91 products.

Where Was the Product Applied?

As shown in Table 24, close to two-thirds (63.6%) of the 180 products were used on hard surfaces, followed by 36 (20.4%) that were applied on lawns or turf, and 36 (20.4%) on ornamental landscaping. Only 19 products (10.7%) were applied to food plants. A total percent is not provided since respondents could indicate that the product was applied to more than one area. Three of the responses categorized as "other" are products that were applied "indoors". Other responses included "hanging in the backyard" and "hanging from the ceiling."

Table 24

Where product was applied	Frequency	Percent
Hard surfaces	112	63.6%
Lawns or turf	36	20.4%
Ornamental landscaping	36	20.4%
Food plants	19	10.7%
Other	10	5.6%

Product Point of Sale: Store Type

As depicted in Table 25 on the next page, respondents indicted that they had purchased 73 (42.2%) of the products at large home supply stores (such as Home Depot). Forty-seven (27.2%) products were purchased at a hardware store, 26 (15.0%) at a grocery or drug store, and 19 (11.0%) at a discount department store (such as Target). Six (3.5%) products were purchased at another type of store. Other responses included "from my farm," "a friend let me have it," and "a salesman came to my door."

Table 25

Point of Pest Control Product Sale	Frequency	Percent
Large home supply store	73	42.2%
Hardware store	47	27.2%
Grocery or drug store	26	15.0%
Discount department store	19	11.0%
Nursery	2	1.2%
Other	6	3.5%
Don't know/ No Response and Refused	7	Omitted from total
Total	180	100.0%

Product Point of Sale: Store Name

For each store type detailed in Table 25 above, respondents were asked to provide the store name where they purchased the pest control product. Table 26 below details the nine most frequent answers provided by survey respondents, which account for approximately 92% of all stores identified. As shown, over one-third (34.1%) of the products used during the past six months were purchased at Home Depot. This is followed by 43 (24.9%) products purchased at Orchard. Many of the store names did not occur in sufficient numbers to categorize, so the third largest proportion of the products (12.7%) were purchased at locations categorized as "other." Respondents that could not name the type of store (see Table 25 above) were not asked to specify. Percentages in Table 26 below are based on 173 valid responses.

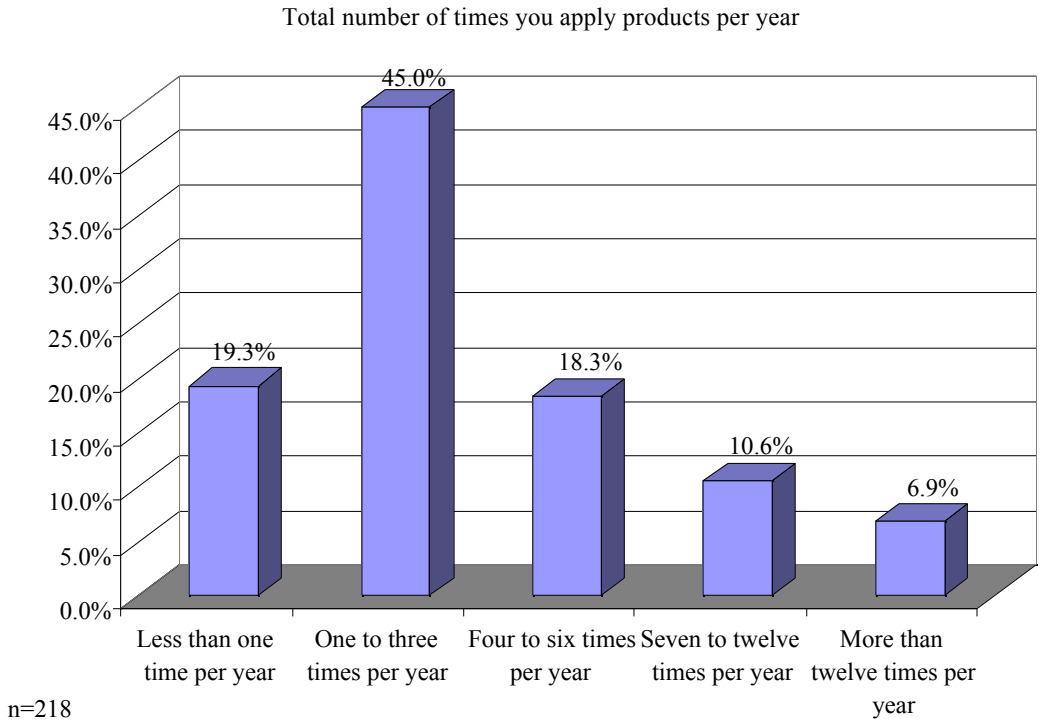
Table 26

Name of Store	Frequency	Percent
Home Depot	59	34.1%
Orchard	43	24.9%
Other	22	12.7%
Ace Hardware	7	4.0%
Don't Remember	7	4.0%
Wal-mart	6	3.5%
Long's Drugs	6	3.5%
Costco	5	2.9%
Target	4	2.3%

How Often People Apply Pest Control Products

The 245 respondents that apply pest control products at home were asked to indicate the total number of times per year that they apply products. Twenty-seven respondents indicated that they did not know. The graph on the following page depicts the distribution of the 218 valid responses. The largest proportion (45.0%) of respondents reported applying products between one and three times per year. Approximately equal proportions of respondents indicated that they apply products less than one time per year (19.3%) and between four and six times per year

(18.3%). Twenty-three (10.6%) respondents apply products between seven and twelve times per year; fifteen (6.9%) apply products more than twelve times per year.



How Do You Decide How Much of the Product to Use?

Of the 240 valid responses, three-quarters of the respondents (n=180, 75.0%) indicated that they "read and follow all directions on the container" when deciding how much of a product to use. Equal proportions of respondents (12.5%) indicated that they "read directions on the container and use them as guidelines", and "don't read the directions, they use experience or best estimate."

Respondents were also asked if they "measure out" or "estimate" the amount of pest control product to spray or apply. Of the 233 responses, 131 (56.2%) indicated that they measure the amount to be used, while 102 (43.8%) estimate.

Pest Control Product Disposal

Disposal of Outdoor Products Mixed With Water

Respondents were asked what they did with the leftover solution for outdoor products that must be mixed with water prior to use. Of the 245 respondents asked, over one-third (n=88, 35.9%) indicated that they do not use products that must be mixed with water and 55 (22.4%) either did not know or refused to answer to answer the question. Of the 102 that use products mixed with water, and were able to provide a response, 42 (41.2%) reported that they only make enough to use and that there is no mixture left over. Similarly, 20 (19.6%) reported that they store it for later use.

As shown in Table 27 below, of the 40 respondents that use products mixed with water and dispose of it, 16 (40.0%) reapply the solution to the same area until it is used up and nine (22.5%) take it to a hazardous waste disposal site. Respondents could provide more than one answer so a total percentage is not computed.

Table 27

Disposal of Outdoor Products Mixed with Water	Frequency	Percent
Reapply to same area until used up	16	40.0%
Take to a hazardous waste disposal site	9	22.5%
Pour on the lawn or in another garden area	6	15.0%
Put in the trash	5	12.5%
Pour down the drain or toilet inside your house	4	10.0%
Pour down drain outside	3	7.5%
Pour in the street or gutter	2	5.0%
Other	6	15.0%

Disposal of Pest Control Products No Longer Used

Respondents that apply pest control products at home were asked how they usually dispose of products that they no longer use. Responses to the open-ended question, "How do you usually dispose of pest control products that you no longer use?" were later coded for analysis.

As shown in Table 28 on the following page, over one-half (51.6%) of the respondents indicated that they dispose of unused pest control products by throwing them in the trash. Slightly more than one-quarter (26.8%) indicated that they take them to a disposal site. A number of responses were not precisely consistent with the question, for instance, 25 (12.4%) respondents indicated that they use the entire product, and three (1.4%) either store it or store it for later use. It is difficult to determine the extent to which the social desirability of a "correct" response (taking a product to a hazardous waste disposal site), and the social undesirability of an "incorrect" response (pouring leftover product in the gutter) influenced these results. However, over one-half of those surveyed admitted to throwing unused products in the trash, lending support to the accuracy of survey responses. Percentages are computed based on 201 valid

replies (44 respondents either "didn't know" or refused to answer the question). A total percent is not provided in Table 28 since respondents could indicate more than one disposal method. Other responses included "The city picks them up," "The county picks them up," and "I use it on the soil only."

Table 28

Disposal of Outdoor Products You No Longer Use	Frequency	Percent
Put in trash	106	52.7%
Take to hazardous waste disposal site	54	26.8%
Use it all	25	12.4%
Store or Store for late use	3	1.4%
Give away	3	1.4%
Only make enough to use, there are no leftovers	3	1.4%
Pour down drain outside house	3	1.4%
Pour in the gutter or street	2	1.4%
Pour down drain or toilet inside house	1	.04%
Other	5	2.4%

Disposal of Pest Control Products No Longer Used and Respondent Demographics

The response options listed in Table 28 above were crosstabulated with several respondent demographic variables: the presence of children in the household, educational attainment, race/ ethnicity, respondent age divided into categories (see Table 2 on page 3), and the combined variable of race/ ethnicity and language of interview (detailed in Table 4 on Page 5).

Presence of Children in the Household

The presence of children in the household was significantly related to two disposal methods, as presented in Table 29 on the next page. The proportion of residents with children (52.9%) indicating that they put products that they no longer use in the trash is higher than the proportion of residents without children (36.9%). Conversely, a higher proportion of residents without children (29.1%) compared to residents with children (11.8%) indicate that they take unused products to a hazardous waste disposal site.

Table 29

Disposal of Products No Longer Used		
	With Children	Without Children
Put products in the trash*	54 (52.9%)	52 (36.9%)
Take to hazardous disposal site***	12 (11.8%)	41 (29.1%)

* p.< .05; **p. < .01; p. < .001

Respondent Age

Looking at the row labeled "Put products in the trash" in Table 30 below, the proportion of residents that throw unused products in the trash decreases with each categorical increase in age—except for the increase from 23.5% of respondents 51 to 60 to 31.3% of respondents 61 and older. Looking at the second row, the proportion of residents that report taking products to hazardous waste disposal sites increases with age (again, except for the decrease between the last two age categories).

Table 30

Disposal of Products No Longer Used					
	18 to 30	31 to 40	41 to 50	51 to 60	61 and Older
Put products in the trash***	26 (68.4%)	31 (53.4%)	20 (41.7%)	8 (23.5%)	21 (31.3%)
Take to hazardous disposal site***	2 (5.3%)	7 (12.1%)	10 (20.8%)	14 (41.2%)	21 (31.3%)

* p.< .05; **p. < .01; ***p. < .001

Race/ Ethnicity and Language of Interview

The combined variable of race/ ethnicity and language of interview is significantly related to two disposal methods, as detailed in Table 31 on the following page. Approximately equal proportions of English-speaking Latinos (38.7%) and all other English-speaking respondents (41.0%) report that they throw unused products in the trash. However, 80% of Spanish-speaking respondents report disposing of products in this manner. Comparing the proportion of respondents that report that they take products to a hazardous disposal site, 49 (26.8%) English-speaking "other" respondents do so, compared to only two (6.5%) English-speaking Latino respondents and no Spanish-speaking Latino respondents.

Table 31

Disposal of Products No Longer Used			
	English-speaking Latino	Spanish-speaking Latino	English-speaking all Others
Put products in the trash*	12 (38.7%)	12 (80.0%)	75 (41.0%)
Take to hazardous disposal site**	2 (6.5%)	0 (0%)	49 (26.8%)

* p.< .05; **p. < .01; ***p. < .001

Level of Education

As shown in Table 32 below, the proportion of residents that report taking unused products to a hazardous waste disposal site increases with each categorical increase in education attainment—again except for the decrease between respondents with AA degrees and respondents with Bachelor's degrees (30.4% and 20.8%, respectively). This relationship is statistically significant.

Table 32

Disposal of Products No Longer Used						
	Less than HS	HS Graduate	Some college	AA	BA	Graduate or Professional
Take to hazardous disposal site*	0 (0%)	6 (12.5%)	15 (22.4%)	7 (30.4%)	11 (20.8%)	13 (38.2%)

* p.< .05; **p. < .01; ***p. < .001

Use of a Hazardous Waste Disposal Site

Of the 245 respondents with home application of pest control products, 90 (37.7%) replied in the affirmative when asked, "Have you or any member of your household taken materials to a household hazardous waste disposal site near you?" and 149 (62.3%) have not. Six respondents did not answer the question.

Pest Control Product Purchasing

How Do You Choose What Pest Control Products to Use?

The 245 respondents involved with home application of pest control products were asked to specify what factors they considered when determining which products to use. The greatest proportion (41.6%) of respondents indicated "health and human safety" was a criterion on which they base their selection, followed by "how fast it works" (27.3%) and "cost" (27.3%). Other factors that respondents consider are "pet safety" (21.6%) and "how long it lasts" (14.3%). The least important factors in determining what product to use were "effectiveness" and "name recognition/ popularity". All of the valid responses (n=231) are presented in Table 33 below. A total percent is not included since respondents could respond to this open-ended question with multiple answers.

Table 33

Choose Product Based On…	Frequency	Percentage
Health and human safety	96	41.6%
How fast it works	63	27.3%
Cost	63	27.3%
Pet safety	50	21.6%
How long it will last	33	14.3%
Ease of application	24	10.4%
Active ingredient	23	10.0%
Environmental concerns	23	10.0%
Recommendation from someone else	19	8.2%
Pest name or picture on label	16	6.9%
Clearly written instructions	8	3.5%
Already have at home	8	3.5%
Packaging	7	3.0%
Effectiveness	7	3.0%
Name recognition/ Popularity of product	6	2.5%
Other	4	1.7%

How Respondents Choose What Pest Control Products to Use and Respondent Demographics

To examine differences in respondent demographics, the response options listed in Table 33 above were crosstabulated with several variables: the presence of children in the household, educational attainment, race/ ethnicity, respondent age divided into categories, and the combined variable of race/ ethnicity and language of interview.

Respondent Age

Table 34 on the next page shows the proportion of respondents in each age category that indicated that they choose products based on "cost" (the first row) and "how fast it works" (bottom row). As depicted in the Table, close to one-half (46.6%) of respondents ages 31 to 40 indicated that "cost" is a factor they consider when choosing pest control products; this is almost 18% higher than respondents 18 to 30 and higher still than the other groups. Looking at the last row of data, only a small proportion (11.9%) of respondents aged 61 and older choose a product based on "how fast it will work."

Table 34

Choose Product Based On…					
	18 to 30	31 to 40	41 to 50	51 to 60	61 and Older
Cost***	11 (28.9%)	27 (46.6%)	10 (20.8%)	6 (17.6%)	9 (13.4%)
How fast it will work*	11 (28.9%)	15 (25.9%)	15 (31.3%)	14 (41.2%)	8 (11.9%)

* p.< .05; **p. < .01; ***p. < .001

Race/ Ethnicity and Language of Interview

The combined variable of race/ ethnicity and language of interview is significantly related to two items, "cost" and "how fast it works," as detailed in Table 35 below. As shown in the Table, nine (60.0%) Spanish-speaking Latino respondents, compared to eight (25.8%) English-speaking Latino respondents and 39 (21.3%) all other English-speaking respondents, report that they choose products based on cost. Also shown in Table 35 below, the proportions of respondents in each of the race/ ethnicity and language categories that choose products based on "how fast it works" are similar to the proportions that choose products based on "cost."

Table 35

Choose Product Based On…			
	English-speaking Latino	Spanish-speaking Latino	English-speaking all Others
Cost**	8 (25.8%)	9 (60.0%)	39 (21.3%)
How fast it will work**	7 (22.6%)	9 (60.0%)	44 (24.0%)

* p.< .05; **p. < .01; ***p. < .001

What Do People Read on a Pest Control Product Label?

The 245 survey respondents that apply pest control products at their residence were read a list of items and asked, "Which of these do you read or look at on a pest control product label before buying it?" Over one-half (56.6%) of survey respondents indicated that they read or look at "safety information," followed closely by 52.0% that read or look at "the list of pests the product controls," and "how to apply" the product (46.2%). Over one-third of the respondents indicated that they look at the "picture of the pest" (37.1%), "when to treat" (36.7%), and "how much to use" (35.3%). Other responses included "how long it will last" and "the temperature at which to use it". Table 36 below details the label information read by the 221 respondents that supplied an answer; again a total percent is not included since respondents could select more than one answer.

Table 36

Read or Look at on a Label	Frequency	Percent
Safety information	125	56.6%
List of pests it controls	115	52.0%
How to apply	102	46.2%
Picture of the pest	82	37.1%
When to treat	81	36.7%
How much to use	78	35.3%
What the ingredients are	64	29.0%
Disposal information	55	24.9%
Other	10	4.5%

What People Read on a Pest Control Product Label and Respondent Demographics

To determine if what people read on a pest control product label is related to the presence of children in the household, educational attainment, race/ ethnicity, age, and the combined variable of race/ ethnicity and language of interview, these items were crosstabulated with each of the label items detailed in Table 36 above. Differences, presented below and the following page, were found between respondents' level of education and race/ ethnicity.

Level of Education

As shown in Table 37 below, one-quarter of respondents with less than a high school education look at "how to apply" the pest control product prior to purchase. This increases to approximately one-third (31.3%) of high school graduates, 38.8% of respondents with some college, but no degree, 41.5% of respondents with a Bachelor's degree. over one-half (52.2%) of respondents with an AA degree, and close to two-thirds (64.7%) of respondents with a graduate or professional degree.

Table 37

Read or Look at on a Label						
	Less than HS	HS Graduate	Some college	AA	BA	Graduate or Professional
How to apply*	3 (25.0%)	15 (31.3%)	26 (38.8%)	12 (52.2%)	22 (41.5%)	22 (64.7%)

* p.< .05; **p. < .01; ***p. < .001

Race/ Ethnicity

As shown in Table 38 below, 90.9% of respondents that self-identified as Black or African American indicated that they look at or read "safety information" on pest control product labels prior to purchase. This diminishes to 54.5% of Asian respondents, 52.2% of Hispanic/ Latino respondents and 46.0% of Caucasian respondents.

Table 38

Read or Look at on a Label				
	Asian	Black or African American	Hispanic or Latino	Caucasian
Safety Information*	12 (54.5%)	10 (90.9%)	24 (52.2%)	69 (46.0%)

* p.< .05; **p. < .01; ***p. < .001

What Sources of Information Influence Your Decision?

Respondents were asked to name the sources of information that influence their decision about what pest control products to buy. Respondents answered this open-ended question without prompts of any kind. As illustrated by Table 39 on the following page, over one-third (36.5%) of respondents indicated that they receive their pest control information by word-of-mouth. The second most frequent answer was that this information is obtained from the labels of the products that they purchase (18.9%), followed by advertisements (16.7%), and store employees (14.9%). Twenty-three respondents were unable to provide a response, thus percentages in Table 39 are based on 222 valid responses. Responses categorized as "other" include UC Davis Cooperative Extension and garden books or articles. A total percent is not provided since respondents could indicate multiple sources of information.

Table 39

Source of information	Frequency	Percent
Word-of-mouth	81	36.5%
Product labels	42	18.9%
Advertisements	37	16.7%
Employee at store where purchased	33	14.9%
Newspaper articles	19	8.6%
Magazine articles	18	8.1%
Posters at store where purchased	15	6.8%
Past experience	11	5.0%
Internet articles	9	4.1%
Other	9	4.1%
Other method at the store where purchased	4	1.8%
Classes	4	1.8%
Tear sheets at store where purchased	3	1.4%
Garden Fairs/Shows	1	.5%

Sources of Information that Influence Your Decision and Respondent Demographics

Respondent Age

As shown in Table 40 below, only 3.4% of respondents 31 to 40 report that their decision to purchase a pest control product is influenced by advertisements. The proportions of respondents 51 to 60 (11.8%) and 61 and older (11.9%) are almost identical. Respondents 18 to 30 (31.6%) seem the most influenced by advertisements.

Table 40

Sources of Information					
	18 to 30	31 to 40	41 to 50	51 to 60	61 and Older
Advertisements**	12 (31.6%)	2 (3.4%)	11 (22.9%)	4 (11.8%)	8 (11.9%)

* p.< .05; **p. < .01; ***p. < .001

Race/ Ethnicity and Language of Interview

The combined variable of race/ ethnicity and language of interview is significantly related to one source of information, as detailed in Table 41 on the following page. As shown in the Table, eleven (73.3%) Spanish-speaking Latino respondents, compared to three (9.7%) English-speaking Latino respondents and 25 (13.7%) all other English-speaking respondents, report that "product labels" are a source of information.

Table 41

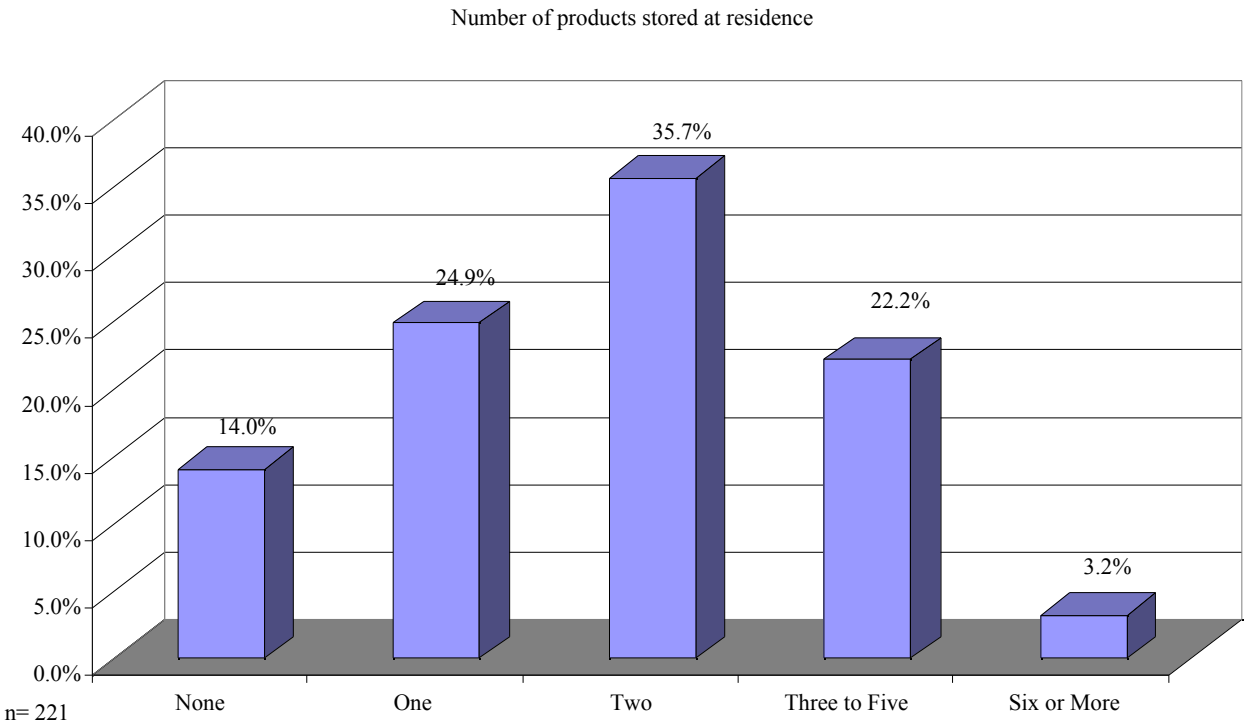
Sources of Information			
	English-speaking Latino	Spanish-speaking Latino	English-speaking all Others
Product Labels***	3 (9.7%)	11 (73.3%)	25 (13.7%)

* p.< .05; **p. < .01; ***p. < .001

Pest Control Product Storage

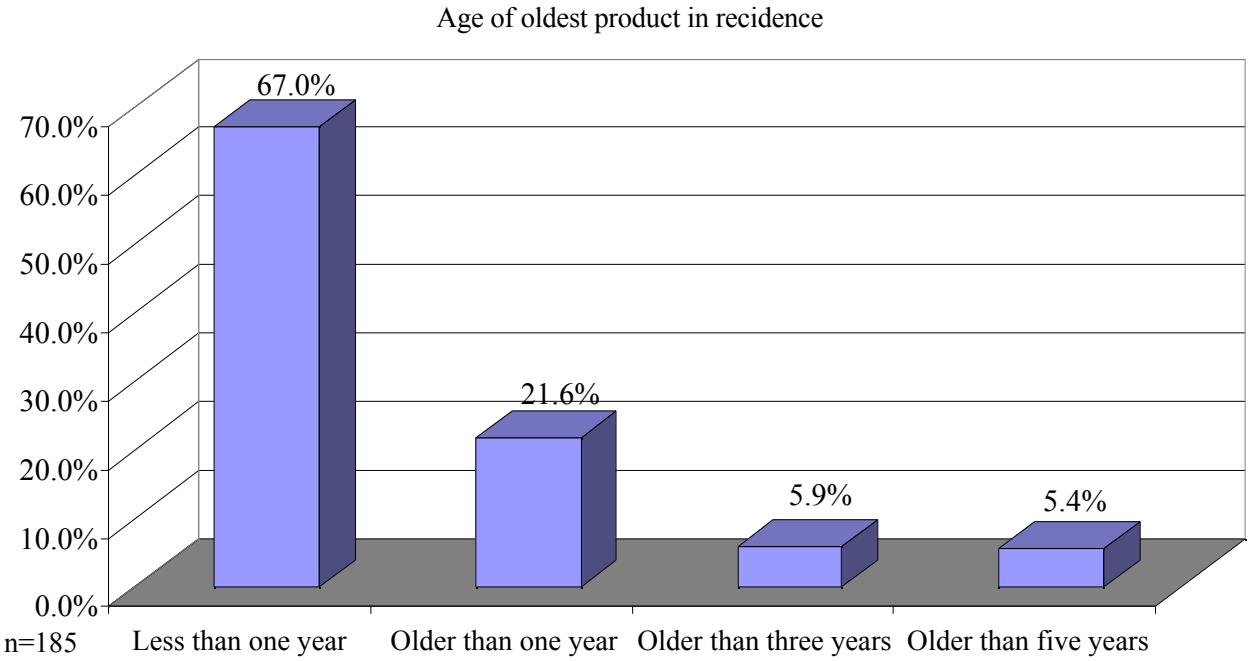
How Many Different Pest Control Products Are Stored in Your Home?

Of the 221 respondents that were able to answer, 31 (14.0%) indicated that no products are currently stored in their home, 55 (24.9%) have one product stored in their home, 79 (35.7%) have two, 49 (22.2%) have between three and five, and seven (3.2%) have six or more products. The graph on the following page depicts these results. Twenty respondents reported that they do not know the number of different products stored in their home and four refused to answer.



Age of Oldest Pest Control Product

If a respondent had at least one product in their home, they were asked to provide the age of the oldest product that they have in their residence. Five respondents were unable to specify the age of their oldest pest control product; the graph on the following page presents the information for the 185 respondents who provided a response. As detailed in the graph, just over two-thirds of respondents (n=124, 67.0%) replied that the oldest product in their home was less than one year old. Forty (21.6%) reported products older than one year, eleven (5.9%) had products older than three years, and ten (5.4%) had products older than five years.

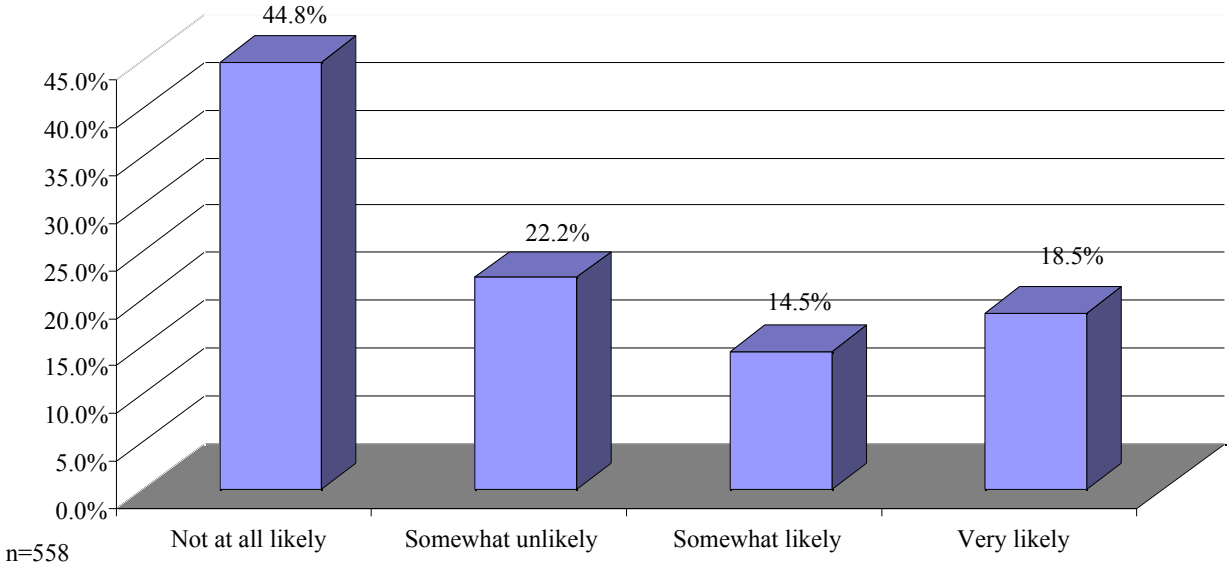


POTENTIAL USE OF ENVIRONMENTALLY-FRIENDLY PEST CONTROL COMPANY

How likely are you to Hire an Environmentally Friendly Pest Control Company?

All survey participants were asked how likely they would be to hire a pest control company or professional that uses methods that pose less risk to the environment. As depicted by the graph on the next page, 250 (44.8%) of the 558 respondents that supplied an answer indicated that they would be "not at all likely." An additional 124 respondents (22.2%) reported that they would be "somewhat unlikely." Approximately one-third (33.0%) of the respondents indicated that they would be "somewhat likely" or "very likely" to hire a company that poses less risk to the environment. Of the 602 respondents surveyed, 44 (7.3%) did not supply an answer.

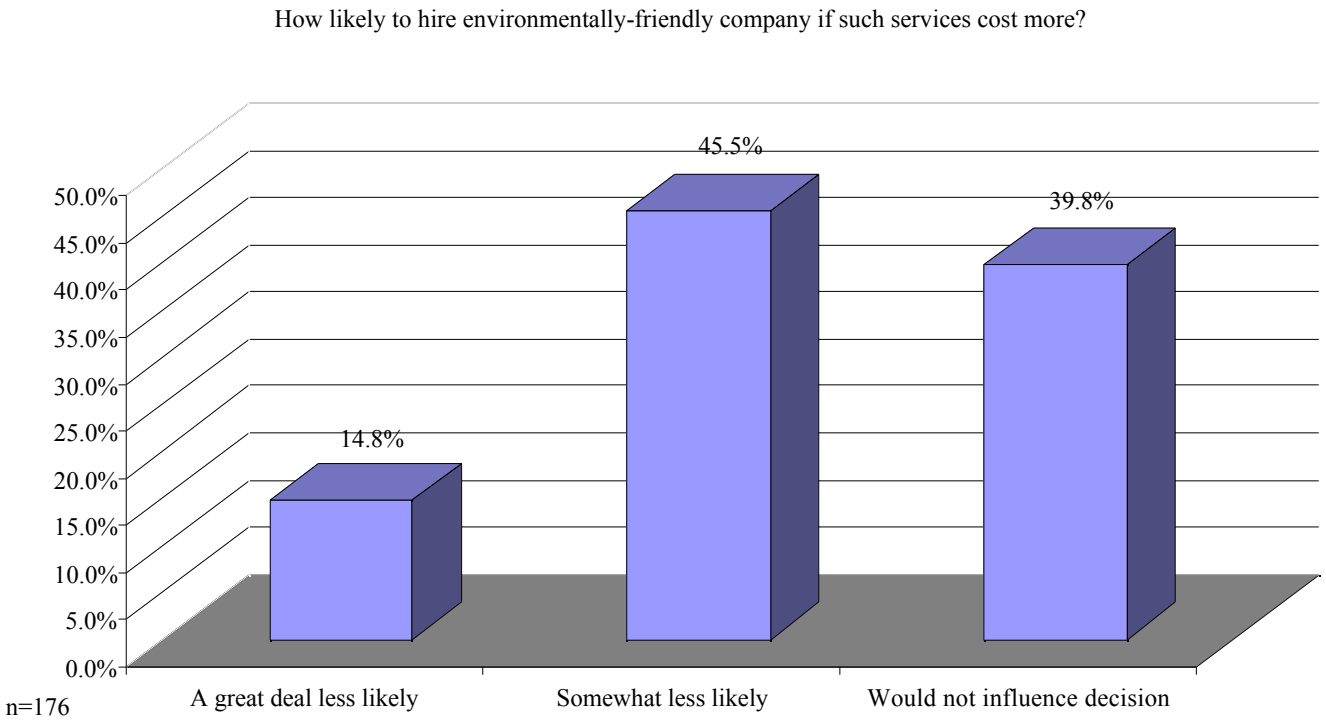
How likely is it that you would hire a pest control company or professional that offers to control pests using methods that pose less risk to the environment?



Respondents that indicated that they were either "somewhat likely" or "very likely" (n=184) to hire an environmentally friendly company or professional were asked a series of questions to determine the extent to which their likelihood of hiring such a company was affected by factors such as cost, a slower method, and the necessity for more follow-up visits.

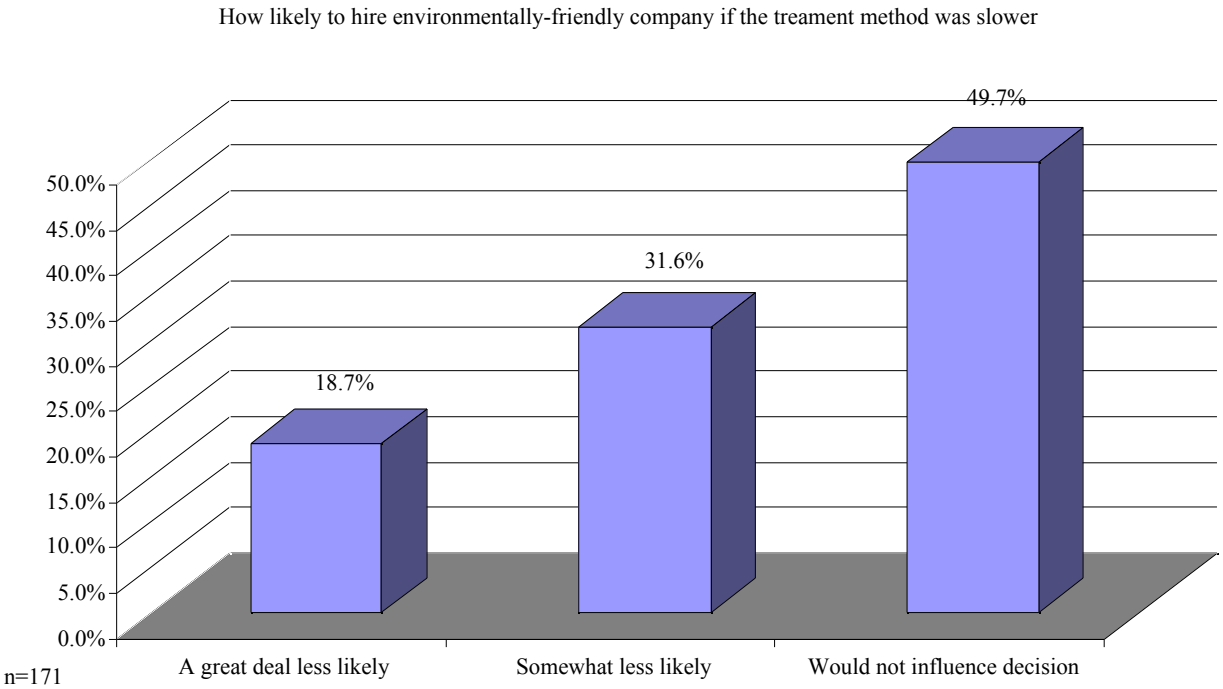
How likely if Services Cost More?

As depicted by the graph on the following page, the largest proportion (n=80, 45.5%) of respondents reported that they would be "somewhat less likely" to hire an environmentally-friendly company or professional if the services cost more. Only 26 (14.8%) respondents indicated that they would be "a great deal less likely." Eight respondents did not answer the question.



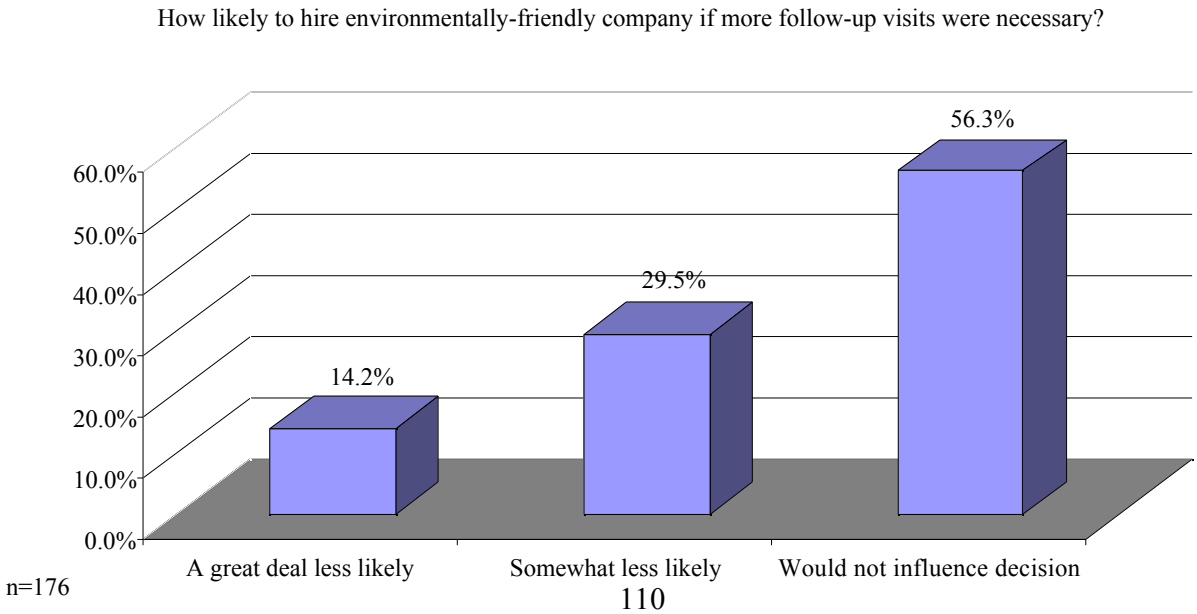
How Likely if Treatment Method was Slower?

Of the 171 valid responses, almost one-half (49.7%) indicated that it would not influence their decision to hire an environmentally-friendly company or professional. Only 32 (18.7%) respondents indicated that they would be "a great deal less likely" to hire such a company. These survey responses are depicted by the graph on the following page.



How Likely if More Follow-up Visits were Necessary?

As depicted in the graph below, over one-half of survey respondents (n=99, 56.3%) indicated that it would not influence their decision if more follow-up visits were necessary. However, 25 (14.2%) respondents indicated that they would be "a great deal less likely" and 52 (29.5%) would be "somewhat less likely" to hire an environmentally friendly company if more follow-up visits were necessary. Eight respondents did not answer the question.

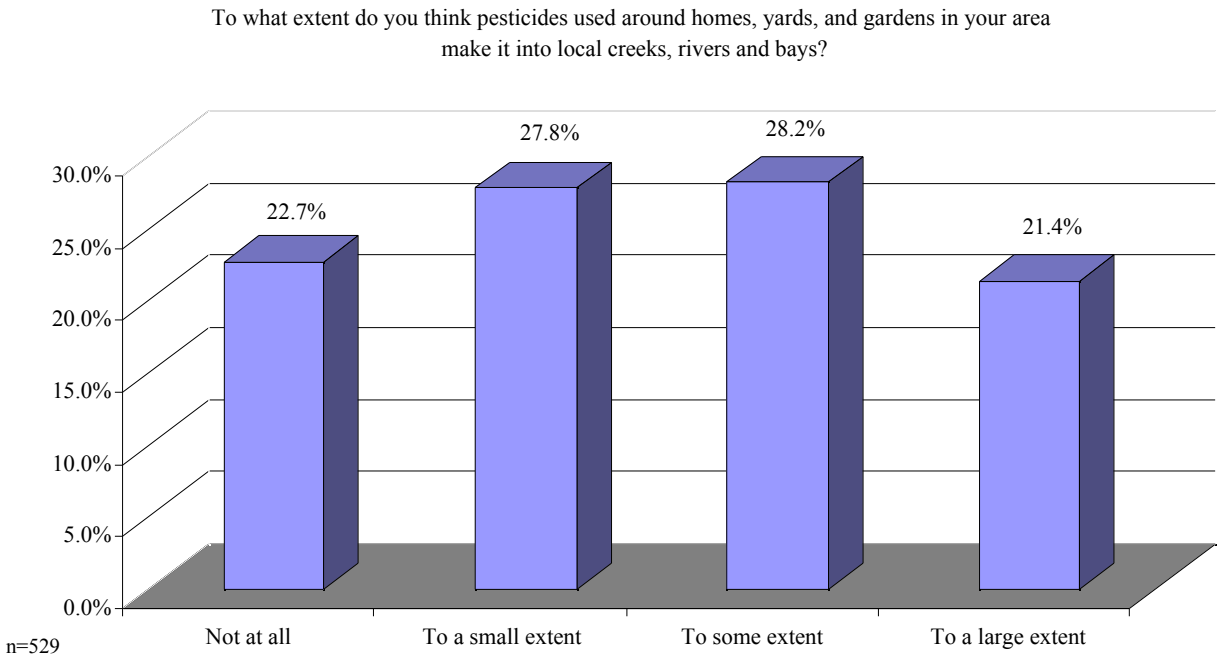


Pesticides And Water Quality

All survey respondents were asked several questions regarding their beliefs about the relationship between pesticide use and water quality, and their knowledge about public services advertisements regarding these issues.

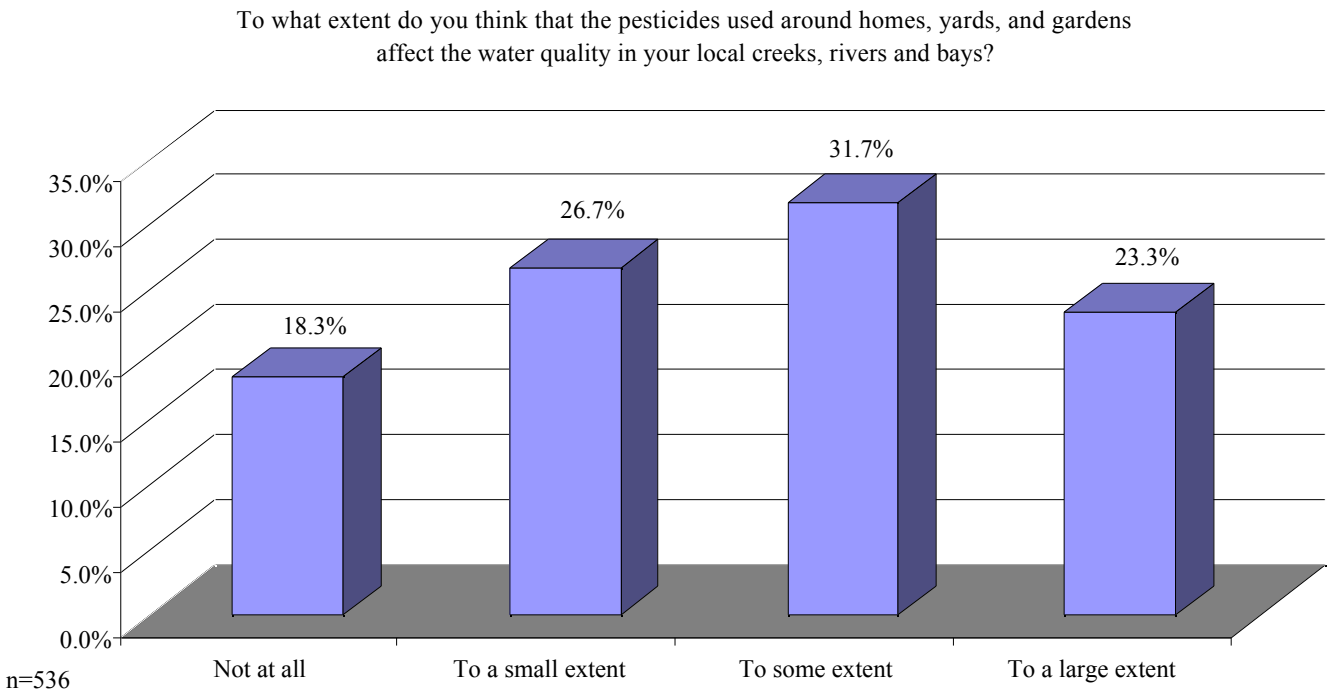
Extent to Which Pesticides Make it Into Local Creeks, Rivers and Bays

As detailed in the graph below, the extent to which respondents feel that pesticides used around homes, yards, and gardens make it into local creeks, rivers, and bays is fairly evenly distributed across the response options. Of the 529 respondents that supplied an answer, 50.5% responded "not at all" or "to a small extent" (combining the proportions in the first two columns in the graph below) and 49.6% responded "to some extent" or "to a large extent" (combining the proportions in the last two columns). Seventy-three respondents (10.4% of the total sample) did not answer the questions.



Extent to Which Pesticides Affect Water Quality in Local Creeks, Rivers and Bays

Just over one-quarter (26.7%) of respondents indicated that they believed "to a small extent" that pesticides used around homes, yards and gardens affect the water quality in their local creeks, rivers, and bays. Just under one-third (31.7%) indicated "to some extent" and 23.3% indicated "to a large extent." The smallest proportion (18.3%) indicated "not at all." Again, 10.9% of the total sample (n=66) did not provide a response. All valid survey responses are detailed in the graph on the following page.



Awareness of Water Quality Posters, Brochures, or Billboards

Of the 602 survey respondents questioned, 238 (40.5%) indicated that they had heard or seen something in the media or on posters, brochures, or billboards about pesticide use and water quality within the last year or so and 349 (59.5%) had not. Fifteen respondents indicated that they did not know if they had heard or seen anything. The 238 that had seen or heard something were asked to describe what they heard or saw and also to describe the source of the information. Of these 238, 197 (82.7%) were able to describe the informational message and/or the source of the information.

Please Describe What you Heard or Saw

Of the 197 respondents, 62 (31.5%) were unable to describe the message that they saw or heard regarding pesticide use and water quality. Table 43 on the following page details the responses of the 135 respondents that provided an answer. The largest proportion (15.6%) of these respondents indicated that they had heard or seen general messages that water runoff or dumping contaminates rivers and creeks. This was followed by 17 (12.6%) respondents that had heard or seen something about chemicals and pesticides negatively affecting water quality, and 16 (11.9%) that described in general terms messages related to water quality and pollution. All valid survey responses are presented in Table 43 on the next page. Answers provided by respondents that are classified as “other” in the table were extremely varied.

Table 43

Message Regarding Pesticide Use and Water Quality	Frequency	Percent
Water runoff or dumping contaminates rivers and creeks	21	15.6%
Chemicals/ Pesticides negatively affect water	17	12.6%
General water quality/pollution	16	11.9%
Advertisements against pouring pesticides down drains or street gutters	14	10.4%
Warnings/ Images of fish next to street gutters	8	5.9%
Dispose of waste properly	8	5.9%
Chemicals/ Pesticides negatively affect fish/ animals	8	5.9%
Other	43	31.9%
Total	197	100.0%

Source of this Information

Respondents were also asked for the source of the message regarding pesticide use and water quality regardless of their ability to describe the message that they had heard or seen; 37 (18.7%) were unable to do so. As detailed in Table 44 below, of the 160 respondents that could identify a source, 42 (26.3%) indicated that they saw or read a message related to pesticides and water quality in the newspaper, followed by 34 (21.3%) that saw information on television, and 17 (10.6%) that read or saw such a message in an unspecified news source.

Table 44

Information Source	Frequency	Percent
Newspaper	42	26.3%
Television	34	21.3%
News – Unspecified	17	10.6%
Pamphlets and fliers sent in mail	12	7.5%
Signs around the community	10	6.3%
Billboard	9	5.6%
Commercials/ Advertisements – Unspecified	6	3.8%
Radio	3	1.9%
Magazine	3	1.9%
Other	24	15.0%
Total	197	100.0%

Have you done anything differently in response to this information?

Of the 238 respondents asked, only 43 (18.9%) indicated that they have done something in response to the information and 185 (81.1%) have not. Ten respondents did not answer the question. Table 45 below details the responses for the 43 respondents that took action in

response to the information that they saw or heard. As shown, equal proportions of respondents (16.3%) indicated that they cut back on their use of pesticides and do not dump harmful chemicals in the street or drains. These are followed closely by six (14.0%) respondents that are more cautious or careful about the application and disposal of pesticides, five (11.6%) respondents that are more careful about their drinking water, and five (11.6%) respondents that took political or community action, such as voting for the Clean Water Act. All valid responses are detailed in the Table below.

Table 45

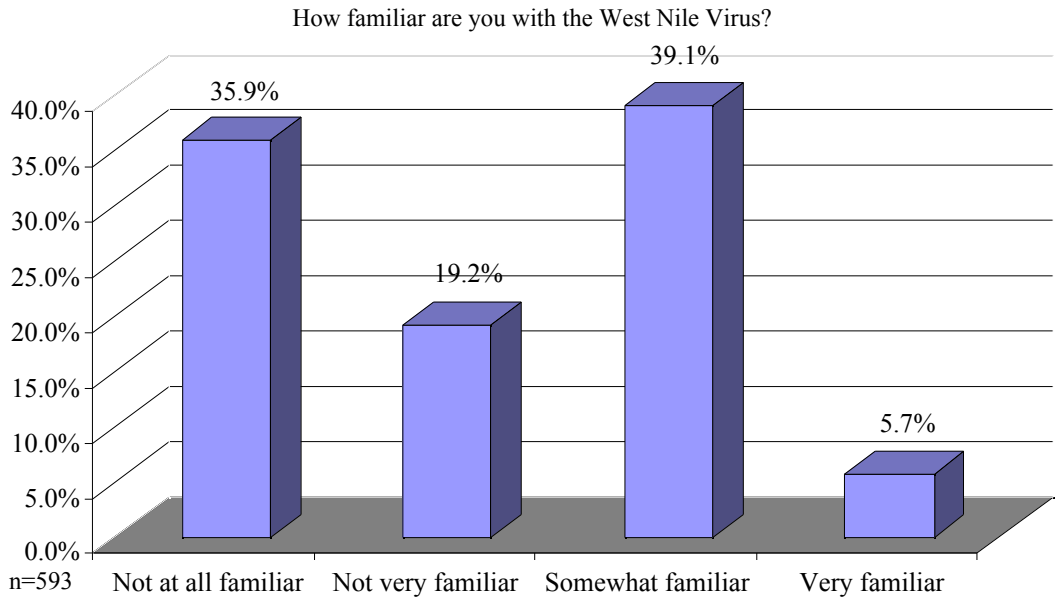
Specify change made in response to information	Frequency	Percent
Cut back on use of pesticides	7	16.3%
Do not dump harmful chemicals in street or drain	7	16.3%
More cautious/careful about application/disposal of pesticides	6	14.0%
More careful about drinking water	5	11.6%
Took political or community action	5	11.6%
Do not use pesticides	4	9.3%
Cautious/careful in general	4	9.3%
More cautious/careful about purchase of pesticides	1	2.3%
Other	4	9.3%
Total	43	100%

The four responses categorized as "other" are: "I've been more careful to keep the screen door closed and have been more observant of what insects and/or weeds are around", "I changed the freon in my car air conditioner", "I do not use drycleaners", and "I empty buckets with water in them to get rid of mosquitoes."

West Nile Virus

Familiarity with the West Nile Virus

Survey respondents were asked about their familiarity with the West Nile Virus. As depicted in the graph on the following page, over one-third (35.9%) of those surveyed indicated that they were "not at all familiar". Only 34 (5.7%) of the 593 respondents that answered the question indicated that they were "very familiar."



Impact of the West Nile Virus

Respondents that indicated that they were "not very familiar," "somewhat familiar" or "very familiar" with the West Nile Virus were asked if they had changed their use of outdoor pest control products in the past six months because of the virus. Of the 371 valid responses, only eleven (3.0%) residents indicated that they changed their use of outdoor pest control products. Responses included "spraying for mosquitoes everywhere there is moisture", and "purchased more since the virus was announced, but I have tried to minimize my use."

Chapter 5: San Francisco Bay Area Watershed Survey

METHOD

Development of the Survey Instrument

As described in Chapter 2, we adapted a survey instrument used in the 2000 Orange County urban pesticide use study developed by Cheryl Wilen, Area IPM Advisor, UC Statewide IPM Program in consultation with various pest management experts and survey specialists at the Social Science Research Center at California State University, Fullerton. For the 2002-03 northern California surveys, this survey was reviewed and revised under the direction of Mary Louise Flint based on input from representatives of the California Department of Pesticide Regulation, the San Francisco Bay Area and the Central Valley Regional Water Quality Control Board who served as a technical advisory committee. Questions were added to further elucidate understanding of water quality issues, disposal practices, issues related to hiring pest control firms and willingness to hire professionals who implement more environmentally sound practices. Copies of the survey questions are included in Appendix B. The survey was almost identical to the ones used in the Sacramento/Arcade Creek and Stockton/Five Mile Slough watersheds except the question about West Nile Virus was eliminated.

Telephone surveys

During the Fall of 2002 and Winter 2003, telephone interviews were conducted by staff of the Social Science Research Center, CSU Fullerton with 1,603 persons in randomly selected households located in the San Francisco Bay area. A total of 1,466 interviews were completed in English, 137 in Spanish or in a mix of Spanish and English. Telephone interviews were conducted from the SSRC's survey research laboratory, utilizing Computer Assisted Telephone Interviewing (CATI) equipment and software. The CATI system is a sophisticated information gathering protocol that contributes to the accuracy of data and to preserving the random nature of the sample.

Telephone interviews were conducted between November 23rd, 2002 and February 1st, 2003, Monday through Thursday from 4-9 p.m.; and Saturday and Sunday from 2:00 p.m. to 8:00 p.m. The questionnaire consisted of approximately 70 items (see Appendix A to review the survey instrument) and required from one to twenty-seven minutes to complete. The average survey administration time depends upon whether pest control products are used in a household, and if so, who applies them. Respondents in household where no outdoor pest control products are applied required an average of six minutes and 26 seconds to complete the survey. When an external company applied pest control products, the survey required an average of six minutes and 34 seconds. Respondents that applied products themselves or shared this responsibility with an external company required an average time of eleven minutes and 46 seconds to complete the survey.

The survey sample was developed in consultation with Scientific Telephone Samples (STS), a proprietary firm specializing in the production of Random Digit Dial (RDD) telephone samples. The sample was constructed in proportion to the number of households within the ZIP codes falling within the watershed boundary. For this survey, zip code alone was sufficient to

determine eligibility. When it was not possible to establish that a potential respondent resided within the watershed boundary, for instance the individual did not wish to provide their ZIP code, he or she was excluded from the study.

The sample frame consisted of both listed and unlisted, old and recently established telephone numbers of all households within the designated watersheds. Therefore, every household in this area with a telephone had an equal non-zero chance of being selected to participate in the study. It is estimated that the penetration of phone lines in residential households in California is over 95%. The precise proportion of households in the San Francisco Bay area with telephones is unknown. It is our belief that no major events occurred during the interview period that might have affected responses to the survey items.

To complete 1,603 interviews, 68,314 individual dialing attempts were made. About 25% (24.1%) of the interviews were completed on the first attempt, 13.5% on the second, 9.9% on the third attempt, 10.5% on the fourth call, and 18.3% on the fifth or higher attempt. This persistence paid off in a response rate of 67.13%; an excellent outcome for an RDD study of this length. The final disposition of each unique telephone number attempted is depicted in Table 1 below.

Table 1

Final Dispositions for Sample Records	
Completes	1,603
No Answer	1,143
Busy	148
Answering Machine/ Voice Mail	785
Phone Disconnect	2,285
Fax Machine	631
Incoherent	82
Not a Residence	686
Spanish Language	10
Other Language	229
Teenager Phone	9
Qualified Refusal	15
Unqualified Refusal	490
Qualified Callback	21
Unqualified Callback	196
Complete Came Back	3
Not Qualified	218
Not Available Project Dates/ Hours	15
Call Blocked	5
Unsure if Residence is in Watershed	0
Quota Cell Full	327
Total Sample	**8,901**

Pearson Chi-Square Analyses

Throughout this report, the Pearson chi-square test is performed to examine the relationship between two categorical variables (e.g. respondent level of education and the manner in which pest control products are disposed). A statistically significant chi-square, with alpha set at $p < .05$ indicates that the observed relationship is likely to occur by chance or sampling error *less than one in twenty times*. An alpha value of .01 denotes that the observed relationship is likely to occur by chance *less than one in one hundred times.*

Optimum use of the Pearson Chi-Square Test (_^{2}) requires that no more than 20% of the cells in the crosstabulation table have expected cell counts less that five. If this assumption is not met, even when the observed relationship appears to be strong, it must be interpreted with caution. Consequently, only analyses that meet expected cell count criteria (greater than five) are presented.

RESULTS

Respondent Demographics

Gender

At the conclusion of each survey, interviewers coded respondent gender. Of the 1,603 completed interviews, 895 (55.8%) were conducted with females and 706 (44.0%) with males. Interviewers were unable to determine the gender of two respondents by voice alone.

Age

Respondents ranged in age from 18 to 91, with an average age of 44 years. The mode, the age reported with the greatest frequency, is 40. As depicted in the table below, the proportion of respondents in each age group is approximately equal other than those 51 to 60. The proportion in this age group is lower (14.2%) than in any other category.

Table 2

Age	Frequency	Percent
18 to 30	305	19.0%
31 to 40	343	21.4%
41 to 50	328	20.5%
51 to 60	228	14.2%
61 and older	399	24.9%
Total	1,603	100%

Presence of Children in Residence

Forty respondents refused to indicate if they have children younger than 18 currently living in their residence. Of the 1,561 valid responses, 635 (40.7%) do have children living with them and 926 (59.3%) do not. Forty-two respondents did not answer the question.

Race/Ethnicity

As depicted by Table 3 on the following page, the largest racial/ethnic group is Caucasian/ White (57.1%), with Hispanics/ Latinos comprising the second largest ethnic group (16.6%). One hundred and six of the 1,603 respondents had no response or refused to disclose their racial/ethnic background.

Survey respondents who self-identified as Asian were asked to specify their race. The largest number of Asian respondents, (n=41, 19.7%), indicated that they were Chinese, 40 (19.2%) Filipino, 32 (15.4%) Asian Indian, 22 (10.6%) Pacific Islander, and 19 (9.1%) Japanese. Responses also included Vietnamese, Korean, and Southeast Asian.

Twenty-seven (67.5%) of the 40 respondents did not provide information regarding their race/ ethnicity beyond the general category of "other". Those that specified self-identified as "Middle Eastern" and "Native American."

Table 3

Race/Ethnicity	Frequency	Percent
Asian	208	13.9%
Black or African American	99	6.6%
Hispanic or Latino	249	16.6%
Caucasian or White	855	57.1%
Bi- or Multi-Racial	46	3.1%
Other	40	2.7%
No Response/Declined to state	106	Omitted from total
Total	1,603	100.0%

Primary Language Spoken at Home

The overwhelming majority (82.3%) of respondents indicated that the primary language spoken in their home was English. One hundred and seventy nine (11.2%) respondents report speaking Spanish in their homes. Other responses included Asian Indian dialects (such as Punjabi and Hindi), Chinese, other Asian languages, and European languages.

Race/Ethnicity and Primary Language of Interview

Respondent race/ ethnicity and language of interview were combined to form a single variable to examine differences between English speaking Latino, Spanish speaking Latino, and all other English speaking respondents. Recall that 1,466 interviews were conducted in English and 137 in Spanish (this includes interviews conducted in a mix of English and Spanish). Table 4 on the following page details this new variable. Respondents that were classified as "other"

race/ethnicity, or did not provide this information, are excluded. As depicted in the table, the largest proportion (83.2%) of respondents are English-speaking non-Latino respondents. The proportions of English-speaking Latino (8.9%) and Spanish-speaking Latino (7.9%) respondents are approximately equal.

Of the 249 Latino respondents in this sample, 132 (53.0%) completed the survey in English and 117 (47.0%) completed the survey in Spanish.

Table 4

Race/ Ethnicity and Language of Interview	Frequency	Percent
English Speaking Latino	132	8.9%
Spanish Speaking Latino	117	7.9%
English Speaking all Others	1229	83.2%
Total	1478	100.0%

City of Residence

Interviews were conducted with residents in approximately 200 unique ZIP codes. City of residence was coded for the 50 cities that occurred most frequently in the survey data; Table 5 below presents data for the 13 most populated cities, which account for 59.0% of the total. As shown in Table 5, the largest proportion (16.6%) of the sample resides in San Jose, followed by 206 (12.9%) in San Francisco, and 106 (6.6%) in Oakland. During survey administration, 74 (4.6%) of the 1,603 respondents refused to disclose their city of residence. City information for these residents was obtained by using their residential Zip Code, which they provided during the initial screening process.

Table 5

City of Residence	Frequency	Percent
San Jose	266	16.6%
San Francisco	206	12.9%
Oakland	106	6.6%
Hayward	51	3.2%
Fremont	50	3.1%
Richmond	37	2.3%
Alameda	35	2.2%

Concord	33	2.1%
San Leandro	33	2.1%
Vallejo	33	2.1%
Berkeley	32	2.0%
Daly City	31	1.9%
Santa Clara	31	1.9%
Total	944	59.0%

Total Annual Household Income

Of the 1,603 survey respondents, 571 (35.6%) either did not know or declined to state their total annual household income, thus percentages in Table 6 on the following page are computed based on 1,032 responses. Overall, income is well distributed across income categories. At least 10% of respondents reported annual incomes between $30,000 and $39,9990 (11.2%), less than $20,000 (10.9%), and between $100,000 and $124,999 (10.0%).

Table 6

Total Annual Household Income	Frequency	Percent
Less than $20,000	113	10.9%
Between $20,000 and $29,999	86	8.3%
Between $30,000 and $39, 999	116	11.2%
Between $40,000 and $49, 999	88	8.5%
Between $50,000 and $59,000	99	9.6%
Between $60,000 and $69,000	66	6.4%
Between $70,000 and $79,999	72	7.0%
Between $80,000 and $89,999	60	5.8%
Between $90,000 and $99,999	58	5.6%
Between $100,000 and $124,999	103	10.0%
Between $125,000 and $149,999	68	6.6%
Between $150,000 and $174,999	38	3.7%
More than $175,000	65	6.3%
Total	1,032	100.0%

Level of Education

As depicted in Table 7 on the next page, just over one-quarter (26.8%) of the 1,519 survey respondents that supplied an answer report having received a Bachelor's Degree, while 341 (22.4%) report having an advanced degree. Nineteen percent report having a high school diploma or GED, followed by 261 (17.2%) that have some college education, but no degree. As shown in Table 7, only 96 (6.3%) respondents report having less than a high school diploma or

GED. Note that education and total annual household income (see Table 6 above) are associated with housing type, and quotas established for multiple-unit attached housing (see next page) have resulted in the over-representation of such households in the final data set. Therefore, the distributions of total annual household income and educational attainment in the survey sample do not accurately represent the entire population of the San Francisco Bay area watershed. Both income and level of education are skewed toward the low end (less education and lower annual household income) as a result of the over-representation of apartment and attached home dwellers in this sample.

Table 7

Highest Level of Education	Frequency	Percent
Less than high school diploma/GED	96	6.3%
High school diploma/GED	289	19.0%
Some college, no degree	261	17.2%
Associate degree	125	8.2%
Bachelor's degree	407	26.8%
Graduate or Professional degree	341	22.4%
Total	1,519	100.0%

Type of Residence

Previous studies conducted in San Diego and Orange Counties revealed that persons residing in apartments and attached homes (multi-family units) rarely assume personal responsibility for the application of pest control products at their residences. Consequently, they are unable to respond to questions regarding product use and disposal. Residents in multi-family attached units are nevertheless an important component of the population. To allocate survey resources most effectively, a quota was established to limit completed surveys from residents in attached homes, apartments, and other residential types (such as school dormitories) to no more than 600; the final multi-family units in the sample is 567. In contrast, 1,036 completions were obtained from residents in single-family detached homes and mobile homes.

Because multiple-unit attached housing is actually over-represented in the final data set, variables closely associated with residential type (such as household income, city of residence and home ownership) do not accurately depict the population residing within the Bay Area. These data are well-suited, however, to between-category comparisons.

As shown in Table 8 on the following page, 1,023 (64.1%) survey respondents resided in single-family detached homes and 394 (24.7%) report living in apartments. Of the 1,603 survey respondents, 160 (10.%) reside in attached homes, such as condominiums or townhouses.

Table 8

Type of Residence	Frequency	Percent
Single-family detached home	1,023	64.1%
Attached home	160	10.0%
Apartment	394	24.7%
Mobile home	13	.8%
Other	5	.3%
Refused	8	Omitted
Total	1,603	100.0%

Home Ownership

Sixty-two respondents did not reply to a question concerning ownership of their residence. Of the 1,541 respondents who supplied an answer, 940 (61.0%) reported that they own their residence, while 601 (39.0%) reported that they rent.

For analytic purposes, "type of residence" and "home ownership" were combined to create a new variable. Table 9 below presents this combined variable, omitting respondents who did not answer one or both of the original questions. Over one-half (53.7%) of survey respondents own single family detached homes, followed by 360 (24.2%) that rent apartments. The small number of respondents that reported owning or renting a mobile home, owning an apartment, or owning or renting something else were omitted from this analysis.

Table 9

House Type/ Ownership	Frequency	Percent
Own a single family detached home	799	53.7%
Own an attached home	100	6.7%
Rent a single family detached home	174	11.7%
Rent an attached home	56	3.8%
Rent an apartment	360	24.2%
Total	1,489	100.0%

Outdoor Pest Control

Who Applies Outdoor Pest Control Products

All survey respondents were asked, "Who at your residence applies outdoor pest control products?" As depicted in Table 10, 442 (28.6%) survey respondents indicated that either they (27.5%) or another member of their household (1.1%) is responsible for outdoor pest control product application. One hundred and thirty-three (8.6%) respondents report that a commercial company, apartment complex, or homeowner's association not directly contracted by them is responsible for outdoor pesticide application. Just over 40% (40.6%) of the survey respondents indicated that no outdoor pest control products are applied at their residence. Sixty respondents did not provide a response.

Table 10

Who applies outdoor products	Frequency	Percent
Yourself	425	27.5%
Another Member of the household	17	1.1%
Commercial Co., Apt. Complex or Home Owner's Association	133	8.6%
Yourself and a pest control company	20	1.3%
Only a pest control company	86	5.6%
Property Owner or Landlord	228	14.8%
Other	7	.5%
No outdoor pest control products are applied	627	40.6%
Total	1,543	100.0%

For some analyses, the "who applies" classifications above were combined into three categories: Application by others, Self application, and No application of outdoor pest control products. Respondents that indicated that a commercial company, apartment complex or homeowner's association (n=133); only a pest control company (n=86); or their property owner or landlord (n=228) applied pest control products are labeled "Application by Others". Respondents that indicated that they (n=425) or another member of their household (n=17) are responsible for pest control application are labeled "Self Application". The 627 respondents that do not apply pest control products at their residence were so categorized, as illustrated by Table 11 on the next page. The twenty respondents that share responsibility with an outside company and the seven respondents that are categorized as "other" are not included in the new variable.

As shown in Table 11, the largest proportion (41.4%) of the sample report no application of pest control products. Approximately 29% of residents report application by others (29.5%) and self application (29.2%).

Table 11

Who applies outdoor products	Frequency	Percent
Application by Others (Commercial Co., Apt. Complex, Homeowners Assoc., Contracted Company)	447	29.5%
Self Application (respondent or another member of household)	442	29.2%
No outdoor pest control products are applied	627	41.4%
Total	1,516	100.0%

Who Applies Products and Residence Type/ Ownership

Looking at the first column of data in Table 12 below, almost equal proportions of respondents that own a single family detached home report self-application of pest control products (40.0%) and that no outdoor products are applied (41.4%). For residents that own an attached home (the second column of data) almost equal proportions report application by others (39.4%) and non-application (37.2%). The same is true for residents that rent an attached home (the fourth column of data); 41.5% report application by others and 45.3% report no application. Close to one-half (49.4%) of respondents that rent a single family detached home (third column of data) report no application of products at their residence and over one-half of residents that rent an apartment (the last column of data) report that an external company is responsible for product application. The relationship between "Who applies pest control products" and "Residence Type/ Ownership" is statistically significant.

Table 12 Who applies outdoor pest control products (row) by Residence Type/ Ownership (column)

	Own a Single Family Detached Home	Own an Attached Home	Rent a Single Family Detached Home	Rent an Attached Home	Rent an Apartment
Application by Others	141 (18.6%)	37 (39.4%)	38 (22.4%)	22 (41.5%)	186 (56.4%)
Self Application	304 (40.0%)	22 (23.4%)	48 (28.2%)	7 (13.2%)	27 (8.2%)
No outdoor pest control products are applied	315 (41.4%)	35 (37.2%)	84 (49.4%)	24 (45.3%)	117 (35.5%)
Total	760 (100.0%)	94 (100.0%)	170 (100.0%)	53 (100.0%)	330 (100.0%)

p. < .001

Use of a Professional Pest Control Company

What Pests Prompted You to Hire a Professional Company?

Respondents that indicated that a contracted pest control company applies pest control products (n=86), and respondents that share this responsibility with an external company (n=20), were asked what pests prompted them to hire a professional company. Of the 106 respondents asked, seven did not know. The 99 respondents that could identify the pest(s) that prompted them to hire a professional company named 119 pests. The percentages in Table 13 below are based on the 99 residents, not on the 119 pests that they named. As depicted in Table 13, 59 (59.5%) respondents indicated that they hired an outside pest control company to combat ants, 11 (11.1%) to combat snails or slugs, and ten (10.1%) to control rats or mice. A total percent is not provided since many respondents named multiple pests. Responses categorized as "other" include beetles, whiteflies, mosquitoes, weeds, silver fish, and "gophers and raccoons." Two respondents indicated that they hired a professional company to prevent pest problems.

Table 13

Use of Pest Control Products	Frequency	Percent
Ants	59	59.5 %
Snails/ Slugs	11	11.1%
Rats or mice	10	10.1%
Wasps, bees, or stinging insects	8	8.0%
Termites	8	8.0%
Crickets	7	7.0%
Cockroaches	5	5.0%
Other	11	11.1%

Why did you Hire a Professional Pest Control Company?

One respondent did not provide a response as to why he or she hired a professional pest control company. As depicted in Table 14 on the next page, of the 105 residents that answered the question, the largest proportion (n=36, 34.2%) replied that they hired a professional company due to the seriousness of the pest problem. Thirty-three (31.4%) respondents hired a professional company because of the "expertise" and 33 (31.4%) hired a professional company for the convenience that the company offered. Thirteen (12.3%) hired a professional company because self-application failed. The categories listed in Table 14 on the following page were developed based on survey responses. Residents were not read a list of options. Responses categorized as "other" in Table 14 include "recommendation from someone", and "I have seven acres of land, I can't do it myself." A total percent is not provided since respondents could name several reasons for hiring a professional company.

Table 14

Reason for hiring	Frequency	Percent
Seriousness of problem	36	34.2%
Expertise	33	31.4%
Convenience	33	31.4%
Application by self failed	13	12.3%
Safety	11	10.4%
A guarantee is provided	8	7.6%
Other	13	12.3%

Where the Professional Company Applies Pesticides

One hundred of the 106 respondents that use a professional company were able to indicate where pesticides are applied at their residence. As shown in Table 15 below, the overwhelming majority (92.0%) indicated that pesticides are applied to hard surfaces, like building perimeters, the bases of buildings, driveways and sidewalks. Thirty-three (33.0%) respondents indicated that pesticides are applied to their lawns or turf, and 22 (22.0%) reported that pesticides are applied to ornamental landscaping such as flowers, shrubs or trees. Since respondents could indicate more than one area, a total percent is not included. Three of the four respondents whose answers are categorized as "other" in the table indicated that pesticides are applied indoors; the other survey respondent replied, "underneath the house."

Table 15

Where Products are Applied	Frequency	Percent
Hard surfaces	92	92.0%
Lawns or turf	33	33.0%
Ornamental landscaping	22	22.0%
Food plants	10	10.0%
Other	4	4.0%

What Pesticide the Company Applies

Only eight of the 106 respondents were able to name the product or products that are applied at their residence. These products are: Diazinon, Dursban, Suspend, Cykick CS, Delta Methrine, Cypermethrin, and Lambda Cyhalothrin. One respondent reported, "The company is Biopest—they use nuts, not chemicals."

Professional Company Schedule

Of the106 respondents that use a professional pest control company, 77 (72.6%) report that they have a contract service that involves scheduled repeat visits and 28 (26.4%) use the service as needed, or on an on-call basis.

Non-Use of Professional Pest Control Company

Why Residents Do Not Hire a Professional Pest Control Company

Respondents that indicated that either they (n=425) or another member of their household (n=17) was responsible for pesticide application were asked why they do not hire a professional pest control company. Nineteen of these 442 respondents did not provide a response. As depicted in Table 16 below, of the 423 valid responses, the majority (n=217, 51.3%) of residents indicated that their pest problems are not serious enough, 81 (19.2%) indicated that a professional company is too expensive, and 61 (14.4%) reported that they have sufficient expertise. Responses categorized as "other" include the presence of babies or pets, and allergic reactions. Since respondents could reply to this open-ended question with more than one reason, a total percent is not included.

Table 16

Reason for Not Hiring	Frequency	Percent
Pest problems are not serious enough	225	53.1%
Too expensive	81	19.2%
I have sufficient expertise	61	14.4%
Application of products by self has been successful or works just as well	33	7.8%
I can apply pest control products safely	27	6.4%
Someone else takes responsibility for applying pesticides	13	3.1%
Do not like or believe in chemicals/ pesticides	11	2.6%
Dissatisfied with professional company	6	1.4%
Other	14	3.3%

How People Identify Outdoor Pests

All survey respondents were read a list of response options, detailed in Table 17 on the next page, to indicate how they identify outdoor pest problems. Two hundred and three (12.6%) respondents indicated that they do not know what pest problems they have and five respondents refused to answer the question. As detailed in Table 17, of the 1,395 valid responses, 1,182 (84.7%) respondents reported that they can identify pest problems from experience, followed distantly by 143 (10.3%) that guess, and 83 (6.0%) that identify pest problems by using a book, magazine, or the Internet. Percentages are computed based on 1,395 valid responses. Since respondents could select more than one option, a total percentage is not provided.

Table 17

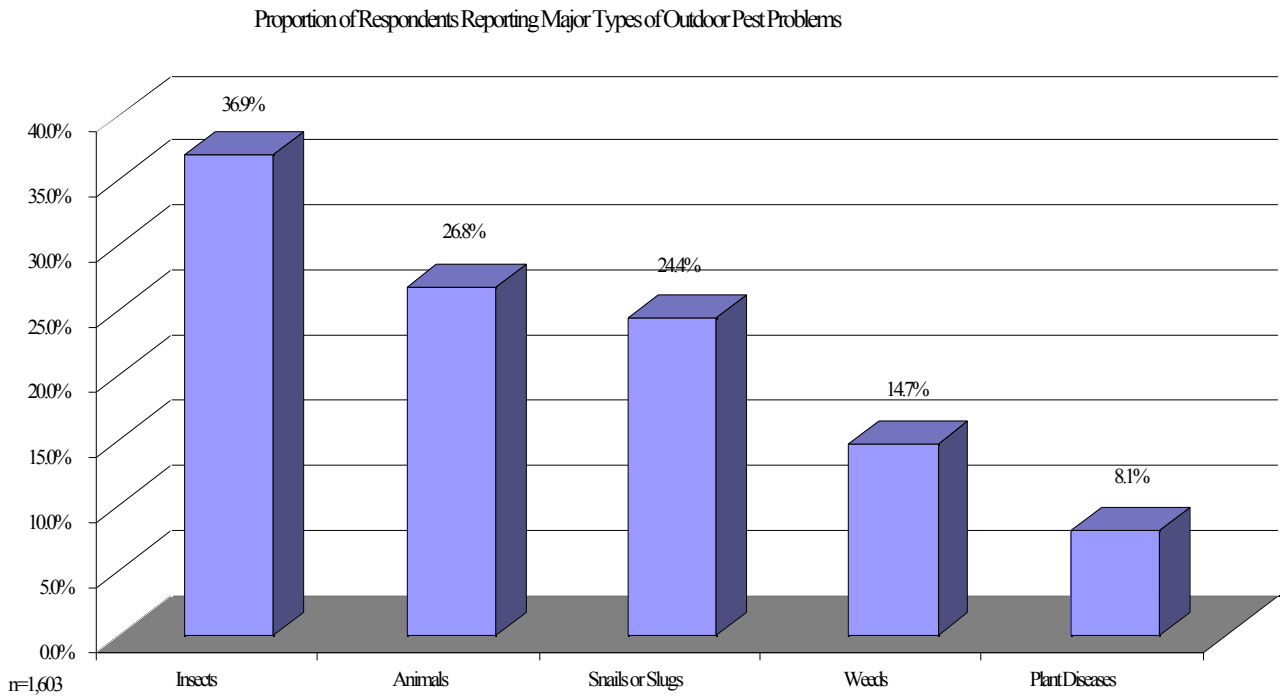
Identification of Pest Problems	Frequency	Percent
Can identify them from experience	1,182	84.7%
Guess	143	10.3%
Identify it by book, magazine, or Internet	83	6.0%
Receive help from store personnel	109	7.8%
Other (Ask friends, relatives, or neighbors; rely on a gardener, receive a professional diagnosis)	31	2.2%

Outdoor Pest Problems

Outdoor Pests

Respondents were asked several questions regarding the main outdoor pests they encounter, focusing upon insects, snails and slugs, animals (such as birds and rodents), plant diseases, and weeds. The graph on the next page details the proportion of respondents, out of 1,603, that indicated that insects, snails or slugs, animals, plant diseases, and/or weeds are major problems around their residence. Information for each of these general categories is detailed in the paragraphs that follow the graph.

As depicted by the graph on the next page, just under 37% (36.9%) of the 1,603 respondents reported insects to be a major outdoor problem, followed by 431 (26.8%) that identified animals, 392 (24.4%) snails and slugs, and 236 (14.7%) that indicated weeds. The lowest proportion of respondents (8.1%) reported that plant diseases are a “major outdoor problem”.



In the sequence of questions pertaining to outdoor pest problems, beginning with "insects" below, multiple pests may have been specified, so percentages do not sum to 100. Unlike the graph above that includes all survey respondents, percentages in the following sections are computed based upon the number of valid responses only (respondents that replied "don't know" or refused to answer the question are excluded).

Insects

Twenty-one respondents did not know if they have an insect problem around their residence. Of the remaining 1,582 residents, the majority (n=995, 62.9%) do not consider insects to be a major outdoor problem; 587 (37.1%) do. Of the 587 residents that identified insects as a problem, approximately three-quarters (n=445, 75.8%) indicated that they had a problem with ants, 126 (21.4%) named spiders, 39 (6.6%) flies, 38 (6.5%) termites, 34 (5.7%) cockroaches, 25 (4.2%) mosquitoes, 21 (3.5%) fleas, and 15 (2.5%) reported aphids to be problematic. Other responses included yellow jackets, bees, whiteflies, and wasps.

Vertebrates

Of the 1,590 valid responses, 431 (27.1%) survey respondents indicated that they had a problem with animals such as birds, rabbits, squirrels, gophers, or deer. Of these 431 respondents, 140 (32.5%) indicated that they had a problem with rodents, such as mice and rats, 103 (23.9%) named raccoons, 88 (20.4%) named squirrels, 79 (18.3) birds, 61 (14.1%) gophers and moles, and 46 (10.6%) consider deer to be a major outdoor pest problem. Other responses included rabbits, opossums, and coyotes.

Snails and Slugs

On this item, 1,582 of the 1,603 respondents asked were able to provide an answer. Of these, 392 (24.8%) indicated that they considered either snails or slugs to be a major outdoor problem, while 1,190 (75.2%) do not. Twenty-one respondents did not provide an answer.

Weeds

Of the 1,563 respondents able to answer this question, 236 (15.1%) indicated that weeds are a major outdoor problem, 1,327 (84.9%) said they were not. Over one-half (n=126, 53.3%) of survey respondents were unable to identify the type of weed or grass they considered to be problematic. Of the 110 that could identify the problem, 46 (41.8%) identified dandelions, 32 (29.0%) identified crab grass, 28 (25.4%) named Bermuda grass, and 13 (11.8%) replied that clover was a problem around their residence. Other responses included foxtail, spurge, and miscellaneous grasses (such as Dallas, Rye and Nut grass).

Plant Diseases

Of the 1,554 valid responses, only 131 respondents (8.4%) indicated that plant diseases are a major outdoor problem. Of these 131 respondents, 20 (15.2%) could not identify the plant diseases that they consider problematic. Of the 111 able to specify, 43 (38.7%) listed mildew, 29 (26.1%) identified black spots, 21 (18.9%) fungus, seven (6.3%) identified mold, and seven (6.3%) Peach Leaf Curl. Eight (7.2%) respondents misidentified aphids as a plant disease. Other responses included dieback, scale, and other tree and leaf diseases.

Outdoor Pest Problems and Type and Ownership of Residence

The combined variable of Residence Type/ Ownership (see Table 9 on page 8) was significantly related to whether respondents reported insects, animals, snails and slugs, weeds, and plant diseases to be major outdoor problems. These differences are detailed in the text and tables on this and the next few pages.

Insects

As depicted in Table 18 on the next page, just over three-quarters (76.8%) of residents that rent attached homes report insects to be a major outdoor problem, followed closely by 72.2% of residents that rent apartments and 68% of residents that own attached homes. Almost equal proportions of residents that rent single family detached homes (61.5%) and own single family detached homes (56.6%) report insects to be a major outdoor problem. Overall, a higher proportion of residents in attached homes (both residents that own and rent) and apartments report insects to be problematic. The relationship between Residence Type/ Ownership and the proportion reporting insects to be problematic is statistically significant.

Table 18

Residence Type/ Ownership	Proportion Reporting Insects to be a Major Problem
Own a single family detached home	56.6%
Own an attached home	68.0%
Rent a single family detached home	61.5%
Rent an attached home	76.8%
Rent an apartment	72.2%

p. < .001

Animals

As depicted in Table 19 below, close to one third (31.2%) of respondents who own single family detached homes indicated that they consider animals to be a major outdoor problem. This is followed by 27.3% of respondents that rent attached homes. The proportions of residents reporting animals to be problematic in the other residential types is almost identical; slightly more than one-fifth of residents that rent apartments (21.8%), own attached homes (21.4%) and rent single family detached homes (21.4%) report animals to be problematic. Although the relationship between Residence Type/ Ownership and the proportion reporting animals to be problematic is statistically significant, as noted, the differences are slight.

Table 19

Residence Type/ Ownership	Proportion Reporting Animals to be a Major Problem
Own a single family detached home	31.2%
Own an attached home	21.4%
Rent a single family detached home	21.4%
Rent an attached home	27.3%
Rent an apartment	21.8%

p. < .01

Snails and Slugs

As depicted in Table 20 on the next page, over one-third (33.7%) of respondents who own single family detached homes indicated that they consider snails or slugs to be a major outdoor problem, compared to between 12% and 19% of respondents in the other residential types reporting such a problem. Close to one-fifth (19.6%) of residents that own attached homes, 17.4% of respondents that rent single family detached homes, 16.7% that rent attached homes, and 12.0% of residents that rent apartments consider animals to be problematic. This relationship is statistically significant.

Table 20

Residence Type/ Ownership	Proportion Reporting Snails or Slugs to be a Major Problem
Own a single family detached home	33.7%
Own an attached home	19.6%
Rent a single family detached home	17.4%
Rent an attached home	16.7%
Rent an apartment	12.0%

p. < .001

Weeds

As shown in Table 21, just over one-fifth (21.2%) of residents that own single family detached homes report a problem with weeds. Surprisingly, only 7.4% of respondents that rent single family detached homes report such a problem. Of the respondents that rent apartments, 14.9% report a problem with weeds, followed by 11.3% of residents that rent attached homes Only 4.3% of residents that own attached homes reported a major problem with weeds. This relationship is statistically significant.

Table 21

Residence Type/ Ownership	Proportion Reporting Weeds to be a Major Problem
Own a single family detached home	21.2%
Own an attached home	4.3%
Rent a single family detached home	7.4%
Rent an attached home	11.3%
Rent an apartment	14.9%

p. < .001

Plant Diseases

As depicted in Table 22 on the following page, approximately 12% (11.5%) of respondents who own single family detached homes indicated that they consider plant diseases to be a major outdoor problem. This is followed by 8.3% that own attached homes and almost equal proportions that rent single family detached homes (4.7%) and rent apartments (4.1%). Only 1.9% of residents that rent attached homes reported plant diseases to be problematic. This relationship is statistically significant.

Table 22

Residence Type/ Ownership	Proportion Reporting Plant Diseases to be a Major Problem
Own a single family detached home	11.5%
Own an attached home	8.3%
Rent a single family detached home	4.7%
Rent an attached home	1.9%
Rent an apartment	4.1%

p. < .001

Pest Control Product Use Within The Past Six Months

Following a branching sequence, respondents who indicated that they (n=425) or another member of their household (n=17) apply outdoor pest control products, and respondents that share this responsibility with a contracted company (n=20), (see Table 10 on page 9), were asked a series of more detailed questions about their use and disposal of outdoor pest control products.

Of the 462 residents asked, 263 (58.2%) reported that they had used a pest control product at their residence within the past six months, 189 (41.8%) had not, and ten residents did not know. The 263 who had used a product within the past six months were asked to indicate how many different products they had used. Of the 259 respondents who could answer the question, approximately two-thirds (n=171, 66.0%) indicated that they had used only one product. Fifty-eight (22.4%) had used two, 26 (10.0%) had used three, and three (1.2%) respondents reported having used four different products in the past six months. Thus, 259 survey respondents used a total of 382 products.

The 259 survey respondents able to identify the number of different products they had used during the past six months were asked for the name of the product, what they used the product to control, the form of the product they used, where they purchased it, and where it was applied at their residence. These survey items are discussed individually in the pages that follow.

Pest Control Product Name

Respondents were asked to provide the name of each different product that they had used during the past six months. If respondents named more than one product, multiple responses were tallied. The total number of products named by respondents is 382; however, the nine most frequently named products account for 82.2% of all responses. These results are depicted in Table 23 on the following page. As shown in Table 23, the largest category is "other" followed by "unknown." Sixty (15.7% of the total) products were an unknown formulation of "Raid" and 28 (7.3%) were an unspecified formulation of Round-Up. Given the large proportion of respondents that report ants to be problematic, it is likely that many of the "unknown formulations of Raid" are Raid products, such as Raid Ant and Roach Spray, used to control

ants. Percentages in the table below are computed based upon the total of 382 products used by 259 survey respondents.

Table 23

Product Name	Frequency	Percent
Other	76	19.9%
Unknown	67	17.5%
Raid, Unknown formulation	60	15.7%
Round-Up	28	7.3%
Ortho Brand, Unknown product	24	6.3%
Snail bait (generic)	19	5.0%
Diazinon, Unspecified formulation	14	3.7%
Ant killer stakes-Unspecified	14	3.7%
Ant spray-Generic	12	3.1%

Target of the Pest Control Product

Respondents were asked to indicate the target for each pest control product they named. In sum, 382 products were used to control 413 pests. As shown in Table 24 below, 177 (46.3%) of the products used by survey respondents during the past six months were used to eliminate ants. Use of a product for snails or slugs was the second most frequent response, although only 51 (13.4%) products were used for this purpose. This is followed by 34 products (8.9%) used to control weeds. Table 24 details the eight most frequent pests targeted. Percentages are calculated based on the 382 products used, not on the 413 pests these products were used to combat.

Table 24

Use of Pest Control Products	Frequency	Percent
Ants	177	46.3%
Snails or Slugs	51	13.4%
Weeds	34	8.9%
Rodents	23	6.0%
Insects-Unspecified	18	4.7%
Spiders	11	2.9%
Plant Diseases	11	2.9%
Hornets/Wasps	9	2.4%

Product Form

Table 25 on the next page details the form for 374 of the 382 products used by survey respondents during the past six months (product form for the other eight products was not known to survey respondents). The largest proportion (n=171, 45.7%) of the products were ready-to-use sprays, 61 (16.3%) were concentrated sprays, 59 (15.8%) were enclosed baits, 46 (12.3%) dry

granules, and thirteen (3.5%) dust. The "other" responses were "pellets", "a thin paste or thick liquid", "chalk", "moth balls", and non-chemical forms such as baking soda and candles.

Table 25

Product Form	Frequency	Percent
Ready-to-use spray (includes aerosols)	171	45.7%
Concentrated spray	61	16.3%
Enclosed baits (ant stakes or plastic housings with bait inside)	59	15.8%
Dry granule	46	12.3%
Dust	13	3.5%
Other	24	6.4%
Total	374	100.0%

Of the 171 ready-to-use sprays, 107 (63.3%) were aerosol cans and 62 (36.7%) were squirt bottles with manual pumps. Respondents were unable to further specify the type of ready-to-use spray for two of the 171 products.

Where Was the Product Applied?

As shown in Table 26, over one half (57.5%) of the 382 products were used on hard surfaces, followed by 79 (20.8%) that were applied on ornamental landscaping, and 69 (18.2%) on lawns or turf. Only 29 products (7.7%) were applied on food plants. Eight of the responses categorized as "other" are products that were applied "indoors". Other responses included "around windows", "hanging outside", "the garage", and "below the surface to combat ants and/or termites". A total percent is not provided since respondents could indicate that products were applied to multiple areas.

Table 26

Where product was applied	Frequency	Percent
Hard surfaces	218	57.5%
Ornamental landscaping	79	20.8%
Lawns or turf	69	18.2%
Food plants	29	7.7%
Other	38	10.0%

Product Point of Sale: Store Type

As depicted in Table 27 on the next page, respondents indicted that they had purchased 153 (43.0%) of the products used in the past six months at large home supply stores (such as Home Depot). Seventy-one (19.9%) products were purchased at a hardware store, 56 (15.7%) at a grocery or drug store, and 28 (7.9%) at a discount department store (such as Target). Twenty-two (6.2%) products were purchased at another type of store. Other responses included a military base exchange, a friend or relative, and pet supply stores.

Table 27

Point of Pest Control Product Sale	Frequency	Percent
Large home supply store	153	43.0%
Hardware store	71	19.9%
Grocery or drug store	56	15.7%
Discount department store	28	7.9%
Nursery	24	6.7%
Catalog or Internet	2	.6%
Other	22	6.2%
Don't know/ No Response and Refused	26	Omitted from total
Total	382	100.0%

Product Point of Sale: Store Name

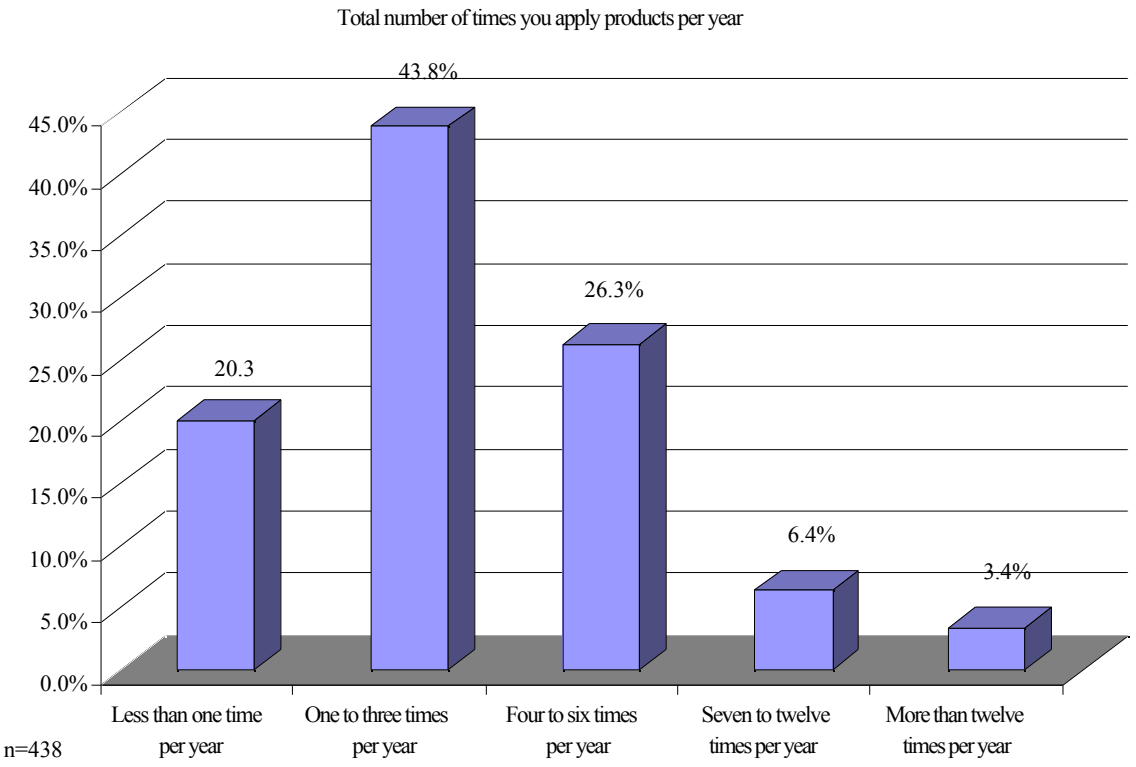
For each store type detailed in Table 27 above, respondents were asked to provide the store name where they purchased the pest control product. Table 28 below details the ten most frequent answers provided by survey respondents, which account for approximately 87.2% of all stores identified. As shown, close to 30% (28.1%) of the products used during the past six months were purchased at Home Depot. This is followed by 53 (14.9%) products purchased at Orchard Supply Hardware. Many of the store names did not occur in sufficient numbers to categorize, so the third largest proportion of the products (12.1%) were purchased at locations categorized as "other." Respondents that could not name the type of store (see Table 27 above) were not asked to specify. Percentages in Table 28 below are based on 356 valid responses.

Table 28

Name of Store	Frequency	Percent
Home Depot	100	28.1%
Orchard	53	14.9%
Other	43	12.1%
Ace Hardware	35	9.8%
Safeway	18	5.1%
Don't Remember	18	5.1%
Albertson's	12	3.4%
Sloats	11	3.1%
Long's Drugs	10	2.8%
Target	10	2.8%

How Often People Apply Pest Control Products

The 462 respondents that apply pest control products at home were asked to indicate the total number of times per year that they apply products. Twenty-four respondents indicated that they did not know. The graph below depicts the distribution of the 438 valid responses. The largest proportion (43.8%) of respondents reported applying products between one and three times per year. Close to 30% (26.3%) of respondents apply products between four and six times per year, while 20.1% apply products less than one time per year. Twenty-eight (6.4%) respondents apply products between seven and twelve times per year; fifteen (3.4%) apply products more than twelve times per year.



How Do You Decide How Much of the Product to Use?

Of the 441 valid responses, just over two-thirds of the respondents that apply products at home (n=296, 67.1%) indicated that they "read and follow all directions on the container" when deciding how much of a product to use. Approximately 20% (19.5%) indicated that they "read directions on the container and use them as guidelines," and 12.9% "don't read the directions, they use experience or best estimate."

Respondents were also asked if they "measure out" or "estimate" the amount of pest control product to spray or apply. Of the 462 persons asked, 422 responded. Of these, 201 (47.6%) indicated that they measure the amount to be used, while 221 (52.4%) estimate. Forty respondents did not answer the question.

Pest Control Product Disposal

Disposal of Outdoor Products Mixed With Water

Respondents were asked what they did with the leftover solution for outdoor products that must be mixed with water prior to use. Of the 462 respondents asked, over one-half (n=264, 57.1%) indicated that they do not use products that must be mixed with water and 20 (4.3%) either did not know or refused to answer to answer the question. As shown in Table 29 below, of the 178 respondents that use products mixed with water, 60 (33.7%) reported that they only make enough to use and that there is no mixture left over. Similarly, 48 (26.9%) reported that they store it for later use. Twenty-seven respondents (15.1%) reapply the solution to the same area until it is used up and 16 (8.9%) dispose of used products by throwing them in the trash. Twelve respondents (6.7%) indicated that they take these products to a hazardous waste disposal site. Respondents could indicate multiple methods of disposal so a total percentage is not computed.

Table 29

Disposal of Outdoor Products Mixed with Water	Frequency	Percent
I only make enough to use, there is no mixture leftover	60	33.7%
Store the product for later use	48	26.9%
Reapply to same area until used up	27	15.1%
Put in the trash	16	8.9%
Take to a hazardous waste disposal site	12	6.7%
Pour down the drain or toilet inside your house	6	3.3%
Pour in the street or gutter	4	2.2%
Pour on the lawn or in another garden area	3	1.6%
Pour down drain outside house	3	1.6%
Other	10	5.6%

Disposal of Pest Control Products No Longer Used

Respondents that apply pest control products at home were asked how they usually dispose of products that they no longer use. Responses to the open-ended question, "How do you usually dispose of pest control products that you no longer use?" were later coded for analysis.

As shown in Table 30 on the following page, close to one-half (49.5%) of the respondents indicated that they dispose of unused pest control products by throwing them in the trash. Slightly less than one-quarter (23.9%) indicated that they take them to a disposal site. A number of responses were not precisely consistent with the question, for instance, 48 (11.7%) respondents indicated that they use the entire product, and 15 (3.6%) either store it or store it for later use. It is difficult to determine the extent to which the social desirability of a "correct" response (taking a product to a hazardous waste disposal site), and the social undesirability of an "incorrect" response (pouring leftover product in the gutter) influenced these results. However,

close to one-half of those surveyed admitted to throwing unused products in the trash, lending support to the accuracy of survey responses. Percentages are computed based on 410 valid replies (52 respondents either "didn't know" or refused to answer the question). A total percent is not provided in Table 30 since respondents could indicate more than one disposal method. Nine respondents, whose answers are categorized as "other" in the table below, indicated that they do not have products to dispose of. Other responses included "I use it on the soil only," "I follow the directions on the label," and "I let the moth balls melt away."

Table 30

Disposal of Outdoor Products You No Longer Use	Frequency	Percent
Put in trash	203	49.5%
Take to hazardous waste disposal site	98	23.9%
Use it all	48	11.7%
Store or Store for late use	20	4.8%
Put containers in recycle bin	9	2.2%
Give away	8	2.0%
Pour down drain or toilet inside house	6	1.5%
Pour in the gutter or street	4	1.0%
Pour down drain outside house	2	.5%
Other	29	7.0%

Disposal of Pest Control Products No Longer Used and Respondent Demographics

The response options listed in Table 30 above were crosstabulated with several respondent demographic variables: the presence of children in the household, educational attainment, race/ ethnicity, respondent age divided into categories (see Table 2 on page 3), and the combined variable of race/ ethnicity and language of interview (detailed in Table 4 on Page 5). Significant differences in were found in respondent age, respondent race/ ethnicity, and the combined variable of race/ethnicity and language of interview. These differences are explained in the sections that follow. Tables in this section denote if the relationship is significant at the .05, .01 or .001 level of significance.

Respondent Age

Looking at the row labeled "Put products in the trash" in Table 31 on the next page, the proportion of residents that throw unused products in the trash decreases with each categorical increase in age, although several of the decreases are slight. Close to 60% (58.6%) of respondents aged 18 to 30 throw products in the trash. This drops to 48.1% of 31 to 40 year olds, 46.8% of 41 to 50 year olds, 37.9% of 51 to 60 year olds and 36.1% of respondents 61 years of age and older.

Looking at the second row of data labeled "Take to hazardous disposal site," overall, the proportion of residents that report taking products to hazardous waste disposal sites <u>increases</u> with age (except for the very slight decrease between the last two age categories).

Table 31

Disposal of Products No Longer Used					
	18 to 30	31 to 40	41 to 50	51 to 60	61 and Older
Put products in the trash*	34 (58.6%)	39 (48.1%)	51 (46.8%)	36 (37.9%)	43 (36.1%)
Take to hazardous disposal site***	4 (6.9%)	8 (9.9%)	19 (17.4%)	30 (31.6%)	37 (31.1%)

* p.< .05; **p. < .01; ***p. < .001

Race/ Ethnicity

As shown in Table 32 below, the proportion of respondents that self-identified as Black or African American that reported that they "put products in the trash" (38.1%) and the corresponding proportion of Caucasian respondents that do so (36.9%) are very close. The proportions of Asian respondents (60.0%) and Hispanic/Latino respondents (61.7%) that use this method of disposal for products that they no longer use are much higher.

As expected, the proportion of respondents that dispose of unused products by "taking them to a hazardous disposal site" follows a reverse pattern. Ten percent of respondents that self-identified as Asian and 10% that identified as Hispanic/Latino report this method of disposal, compared to 19% of Black or African American respondents and 26.5% of Caucasian respondents.

Table 32

Disposal of Products No Longer Used				
	Asian	Black or African American	Hispanic or Latino	Caucasian
Put products in the trash***	30 (60.0%)	8 (38.1%)	37 (61.7%)	106 (36.9%)
Take to hazardous disposal site**	5 (10.0%)	4 (19.0%)	6 (10.0%)	76 (26.5%)

* p.< .05; **p. < .01; ***p. < .001

Race/ Ethnicity and Language of Interview

The combined variable of race/ ethnicity and language of interview is significantly related to two disposal methods, as detailed in Table 33 on the following page. Of the three groups, the highest proportion (69.2%) of Spanish-speaking Latinos report that they dispose of unused products by throwing them in the trash, compared to 55.9% of English-speaking Latinos and 40.8% of all other English-speaking respondents.

Conversely, only one (3.8%) Spanish-speaking Latino respondent, compared to five (14.7%) English-speaking Latino respondents and 85 (22.8%) all other English-speaking respondents report that they take products to a hazardous disposal site.

Table 33

Disposal of Products No Longer Used			
	English-speaking Latino	Spanish-speaking Latino	English-speaking all Others
Put products in the trash**	19 (55.9%)	18 (69.2%)	152 (40.8%)
Take to hazardous disposal site*	5 (14.7%)	1 (3.8%)	85 (22.8%)

* p.< .05; **p. < .01; ***p. < .001

Use of a Hazardous Waste Disposal Site

Of the 462 respondents with home application of pest control products, 195 (43.1%) replied in the affirmative when asked, "Have you or any member of your household taken materials to a household hazardous waste disposal site near you?" and 257 (56.9%) have not. Ten respondents did not answer the question.

Pest Control Product Purchasing

How Do You Choose What Pest Control Products to Use?

The 462 respondents involved with home application of pest control products were asked to specify what factors they considered when determining which products to use. The greatest proportion (40.4%) of respondents indicated "how fast it works" was a criterion on which they base their selection, followed by "health and human safety" (32.3%) and "how long it lasts" (27.2%). Other factors that respondents consider are "pet safety" (24.4%) and "cost" (22.0%). The least important factors in determining what product to use were "effectiveness" and "clearly written instructions". All of the valid responses (n=431) are presented in Table 34 on the next page. A total percent is not included since respondents could respond to this open-ended question with multiple answers.

Table 34

Choose Product Based On…	Frequency	Percentage
How fast it works	174	40.4%
Health and human safety	139	32.3%
How long it will last	117	27.2%
Pet safety	105	24.4%
Cost	95	22.0%
Environmental concerns	69	16.0%
Active ingredient	55	12.8%
Ease of application	37	8.6%
Recommendation from someone else	35	8.1%
Pest name or picture on label	23	5.3%
Packaging	20	4.6%
Already have at home	13	3.0%
Name recognition/ Popularity of product	12	2.8%
Clearly written instructions	7	1.6%
Effectiveness	6	1.4%
Other	14	3.3%

How Respondents Choose What Pest Control Products to Use and Respondent Demographics

To examine differences in respondent demographics, the response options listed in Table 34 above were crosstabulated with several variables: the presence of children in the household, educational attainment, race/ ethnicity, respondent age divided into categories, and the combined variable of race/ ethnicity and language of interview. Significant differences were found only with regard to respondent age, detailed below and in the table on the following page.

Respondent Age

Table 35 on the next page shows the proportion of respondents in each age category that indicated that they choose products based on "cost." As depicted in the Table, one-third of respondents ages 31 to 40 indicated that "cost" is a factor they consider when choosing pest control products, compared to 26.6% of respondents 41 to 50 and 20.7% of respondents 18 to 30. Approximately 8% of respondents 61 and older choose products based on cost.

Table 35

Choose Product Based On…					
	18 to 30	31 to 40	41 to 50	51 to 60	61 and Older
Cost***	12 (20.7%)	27 (33.3%)	29 (26.6%)	17 (17.9%)	10 (8.4%)

* p.< .05; **p. < .01; ***p. < .001

What Do People Read on a Pest Control Product Label?

The 462 survey respondents that apply pest control products at their residence were read a list of items and asked, "Which of these do you read or look at on a pest control product label before buying it?" As shown in Table 36 below, overall, survey respondents report reading or looking at a number of items on a pest control product label. Of the 423 valid responses, almost equal proportions of survey respondents indicated that read or look at "the list of pests the product controls" (61.2%) and "safety information" (60.3%); 241 (57.0%) read about "how to apply" the product. Almost equal proportions of respondents look at the "picture of the pest" (48.0%) and "how much to use" (47.3%). A few respondents, listed in the "other" category, reported that they do not read or look at anything on a product label and instead rely on experience. Other responses included "price" and "how fast it works and how long it lasts." Table 36 below details the label information read by the 423 respondents that supplied an answer; again a total percent is not included since respondents could select more than one answer.

Table 36

Read or Look at on a Label	Frequency	Percent
List of pests it controls	259	61.2%
Safety information	255	60.3%
How to apply	241	57.0%
Picture of the pest	203	48.0%
How much to use	200	47.3%
When to treat	175	41.4%
What the ingredients are	158	37.4%
Disposal information	138	32.6%
Other	14	3.3%

What People Read on a Pest Control Product Label and Respondent Demographics

To determine if what people read on a pest control product label is related to the presence of children in the household, educational attainment, race/ ethnicity, age, and the combined variable of race/ ethnicity and language of interview, these items were crosstabulated with each of the label items detailed in Table 36 above. Differences, discussed on the following pages, were found between respondents' age, race/ethnicity, race/ethnicity and language of interview, and level of education.

Respondent Age

Respondent age was significantly related to three label items. Looking at the first row of data in Table 37 below, less than one in 20 respondents ages 18 to 30 (17.2% of those surveyed) and ages 31 to 40 (19.8%) report that that they look at "disposal information" on a pest control product label prior to purchase. Between 31% and 36% of respondents in the older age categories report looking at "disposal information."

Just over one-quarter (27.6%) of respondents ages 18 to 30 look at "how to apply" the pest control product prior to purchase. This increases to approximately 40% of respondents 31 to 40, over one-half (52.9%) of respondents 61 and older, and 60.6% of respondents 41 to 50. Respondents 51 to 60 appear to be the most concerned about "how to apply" the product, with 66.3% of them looking at this information prior to purchase.

Reading the row of data labeled "when to treat," approximately one in 20 (22.4%) respondents ages 18 to 30 look at "when to treat" information on pest control product labels prior to purchase. The proportion of residents 41 to 50 (44.0%) 51 to 60 (42.1%) and 61 and older (41.2%) that look at "when to treat" prior to purchase are similar.

Table 37

Read or Look at on a Label					
	18 to 30	31 to 40	41 to 50	51 to 60	61 and Older
Disposal information*	10 (17.2%)	16 (19.8%)	40 (36.7%)	34 (35.8%)	38 (31.9%)
How to apply***	16 (27.6%)	33 (40.7%)	66 (60.6%)	63 (66.3%)	63 (52.9%)
When to treat*	13 (22.4%)	25 (30.9%)	48 (44.0%)	40 (42.1%)	49 (41.2%)

* p.< .05; **p. < .01; ***p. < .001

Race/ Ethnicity

Two label items were significantly related to respondent race/ ethnicity. As shown in Table 38 on the next page, one-third of Hispanic/Latino respondents look at "how to apply" the product prior to purchase. This increases to 42.9% of Black/African American respondents. Approximately equal proportions of Asian (52.0%) and Caucasian (55.7%) respondents look at "how to apply" information.

Looking at the second row of data in Table 38, 23.8% of respondents that self-identified as Black or African American indicated that they look at or read "when to treat" information on pest control product labels prior to purchase. This increases slightly for Hispanic/Latino respondents (25.0%), and increases further for Asian (34.0%) and Caucasian (41.5%) respondents.

Table 38

Read or Look at on a Label				
	Asian	Black or African American	Hispanic or Latino	Caucasian
How to apply*	26 (52.0%)	9 (42.9%)	20 (33.3%)	160 (55.7%)
When to treat*	17 (34.0%)	5 (23.8%)	15 (25.0%)	119 (41.5%)

* p.< .05; **p. < .01; ***p. < .001

Race/ Ethnicity and Language of Interview

The combined variable of race/ ethnicity and language of interview is significantly related to four items that respondents read or look at on a pest control product label prior to purchase. These are detailed in Table 39 below. Without exception, compared to English-speaking respondents, a smaller proportion of Spanish-speaking Latinos report that they look at each of the items listed in Table 39 below before purchasing a pest control product. The proportions of respondents in the English-speaking categories are similar.

Table 39

Read or Look at on a Label			
	English-speaking Latino	Spanish-speaking Latino	English-speaking all Others
List of pest it controls*	21 (61.8%)	8 (30.8%)	212 (56.8%)
How much to use**	17 (50.0%)	3 (11.5%)	168 (45.0%)
How to apply***	16 (47.1%)	4 (15.4%)	199 (53.4%)
When to treat**	13 (38.2%)	2 (7.7%)	146 (39.1%)

* p.< .05; **p. < .01; ***p. < .001

Level of Education

Respondent level of education is significantly related to two pest control product label items, as shown in Table 40 on the next page. Three (15.8%) respondents with less than a high school degree report looking at "how much product to use" prior to purchase. This increases to 38.2% of high school graduates, and over one-half (51.8%) of respondents with some college, but no degree. The proportion drops to 36.8% of respondents with an AA degree and then increases again for respondents with Bachelor's degrees (42.9%) and graduate or professional degrees (49.5%).

Looking at the second row of data, only two (10.5%) respondents with less than a high school education look at "how to apply" the pest control product prior to purchase. This increases to 47.4% of high school graduates, and continues to increase with each categorical increase in respondent level of education.

Table 40

Read or Look at on a Label						
	Less than HS	HS Graduate	Some college	AA	BA	Graduate or Professional
How much to use*	3 (15.8%)	29 (38.2%)	44 (51.8%)	14 (36.8%)	51 (42.9%)	53 (49.5%)
How to apply**	2 (10.5%)	36 (47.4%)	42 (49.4%)	20 (52.6%)	64 (53.8%)	66 (61.7%)

* p.< .05; **p. < .01; ***p. < .001

What Sources of Information Influence Your Decision?

Respondents were asked to name the sources of information that influence their decision about what pest control products to buy. Respondents answered this open-ended question without prompts of any kind. As illustrated by Table 41 on the following page, over one-third (35.1%) of respondents indicated that they receive their pest control information by word-of-mouth. The second most frequent answer was that this information is obtained from an employee at the store the product was purchased (26.3%), followed by product labels (14.3%), and advertisements (13.8%). Forty-three respondents were unable to provide a response, thus percentages in Table 41 are based on 419 valid responses. Responses categorized as "other" include UC Davis Cooperative Extension and television and/or radio. A total percent is not provided since respondents could indicate multiple sources of information.

Table 41

Source of information	Frequency	Percent
Word-of-mouth	147	35.1%
Employee at store where purchased	110	26.3%
Product labels	60	14.3%
Advertisements	58	13.8%
Posters at store where purchased	47	11.2%
Magazine articles	38	9.1%
Tear sheets at store where purchased	37	8.8%
Newspaper articles	29	6.9%
Internet articles	29	6.9%
Past experience	21	5.0%
Other method at the store where purchased	15	3.6%
Garden books/ Articles	8	1.9%
Garden Fairs/Shows	8	1.9%
Other	32	7.6%

Sources of Information that Influence Your Decision and Respondent Demographics

The sources of information that influence respondents' decisions about what pest control products to buy listed in Table 41 above were crosstabulated with respondent demographics. The only significant difference, detailed below, was found between respondent age and the proportion that report that "employees at the store where the product was purchased" influence their decision.

Respondent Age

As shown in Table 42 below, only 8.6% of respondents 18 to 30 indicated that store employees influence their decision of what product to purchase. This increases to almost one in four (24.7%) respondents 31 to 40, 28.4% of respondents 41 to 50, and 32.6% of respondents 51 to 60.

Table 42

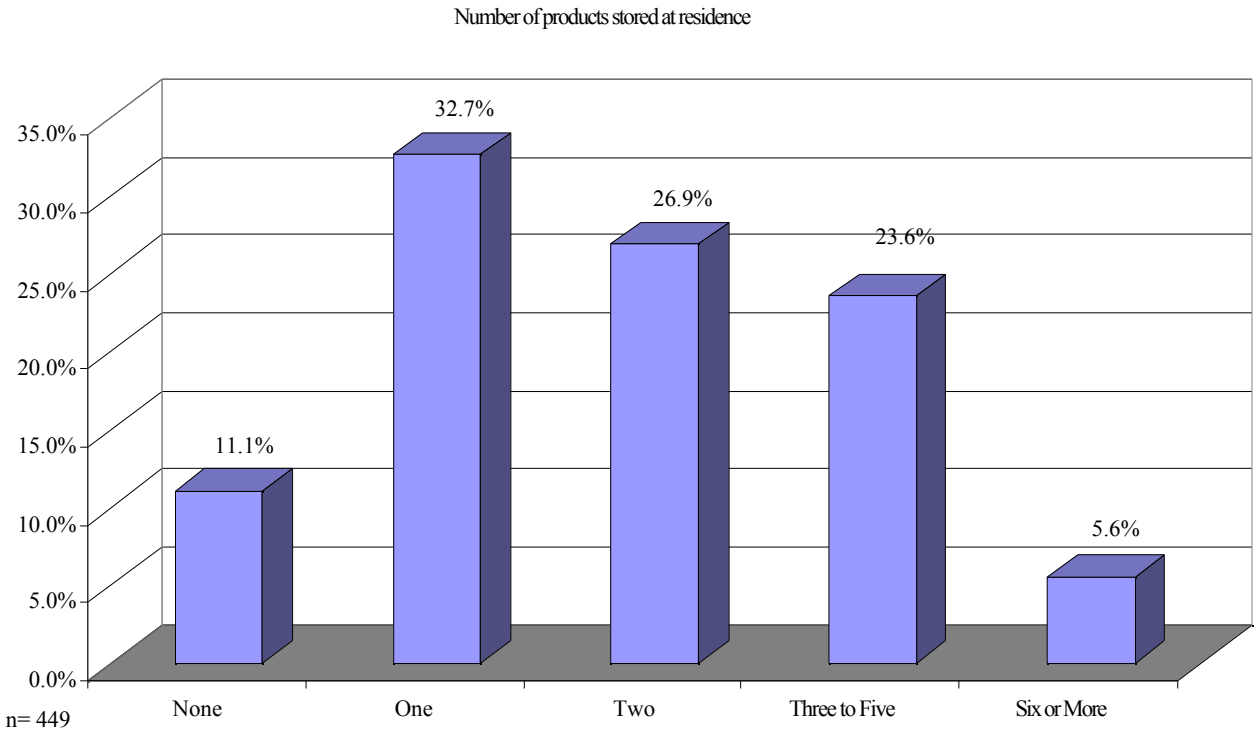
Sources of Information					
	18 to 30	31 to 40	41 to 50	51 to 60	61 and Older
Employee at store where purchased**	5 (8.6%)	20 (24.7%)	31 (28.4%)	31 (32.6%)	23 (19.3%)

* p.< .05; **p. < .01; ***p. < .001

Pest Control Product Storage

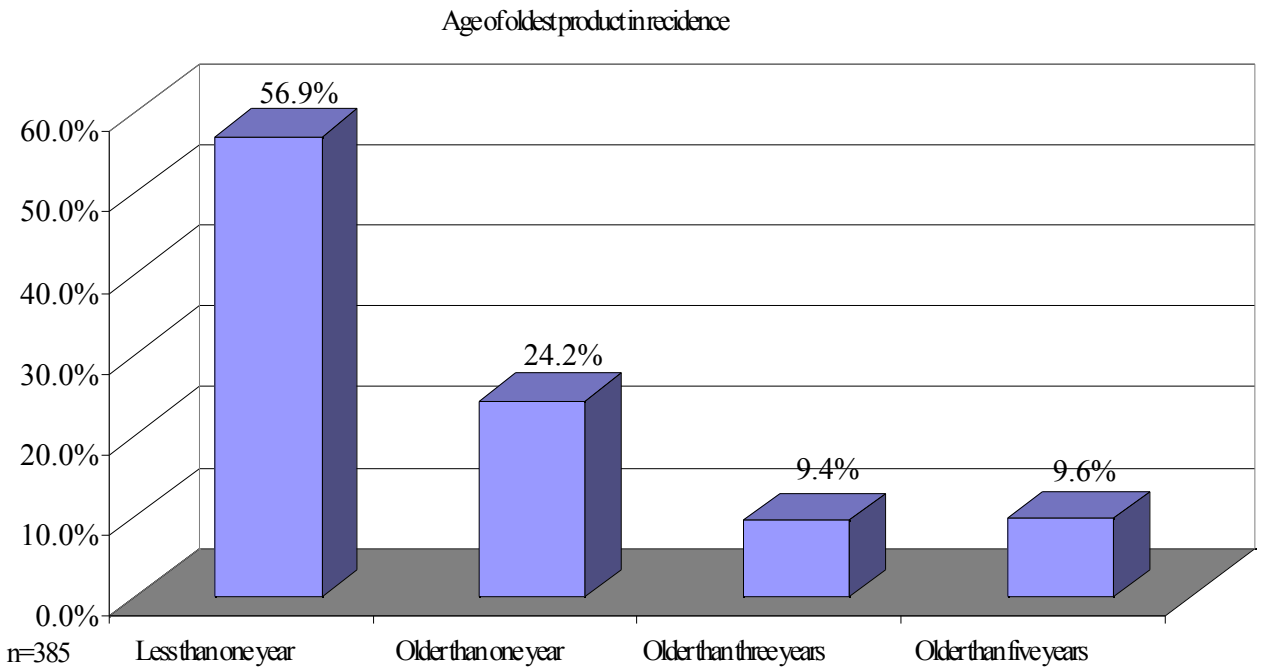
How Many Different Pest Control Products Are Stored in Your Home?

Of the 449 respondents that were able to answer, 50 (11.1%) indicated that no products are currently stored in their home, 147 (32.7%) have one product stored in their home, 121 (26.9%) have two, 106 (23.6%) have between three and five, and 25 (5.6%) have six or more products. The graph below depicts these results. Eight respondents reported that they do not know the number of different products stored in their home and five refused to answer.



Age of Oldest Pest Control Product

If a respondent had at least one product in their home, they were asked to provide the age of the oldest product that they have in their residence. Fourteen respondents were unable to specify the age of their oldest pest control product; the graph on the following page presents the information for the 385 respondents who provided a response. As detailed in the graph, the majority of respondents (n=219, 56.9%) replied that the oldest product in their home was less than one year old. Ninety-three (24.2%) reported products older than one year, 36 (9.4%) had products older than three years, and 37 (9.6%) had products older than five years.



Number of Products Stored in Your Home and Age of Oldest Product

As illustrated by Table 43 on the next page, approximately 74% of the respondents who have one product stored in their homes indicated that the oldest product was "less than one year" old. Of the respondents with two products at home, 63.9% reported that the oldest product is "less than one year." Of the respondents with six or more products (the last column of numbers), 12% indicated that the oldest product is less than one year and five (20.0%) reported that the oldest product is "older than one year" and "older than three years". Reading the row of numbers labeled "older than five years," note that the proportion of respondents with a product older than five years increases from 2.9% of respondents with one product, to 5.0% of respondents with two, 14.9% of respondents with three to five and 48.0% of respondents with six or more products stored at their residence. These results are statistically significant.

Table 43 How Old is the Oldest Product Stored in your Home (row) by Number of Different Products Stored in your Home (column)

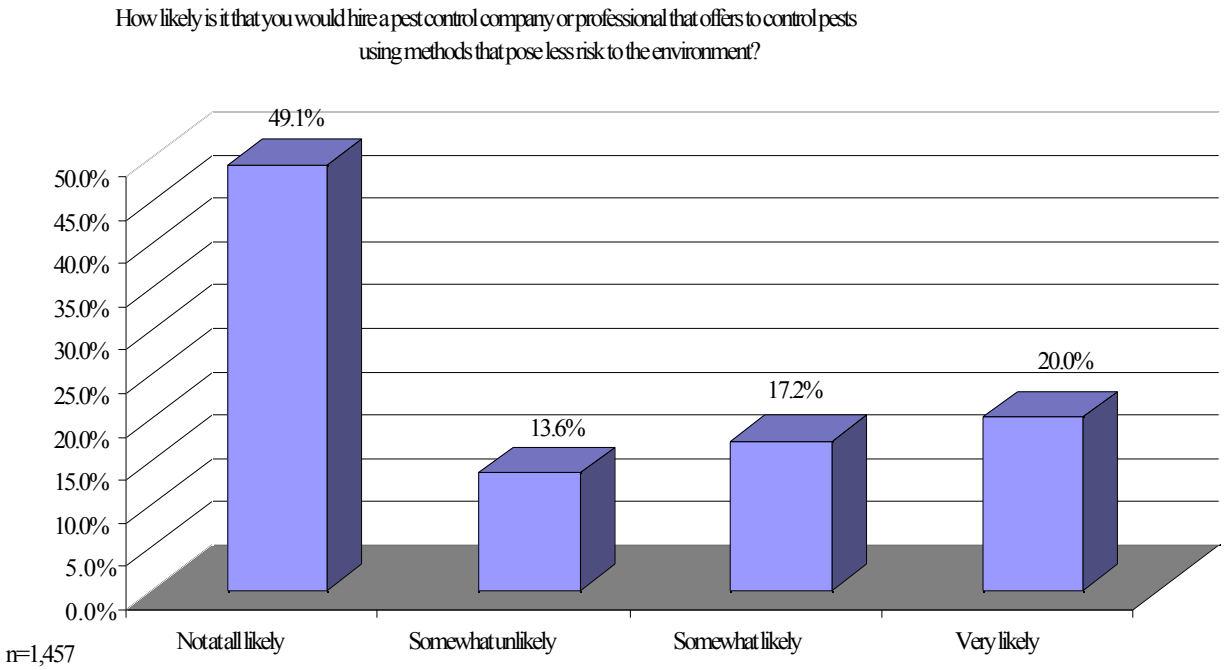
	One	Two	Three to Five	Six or More
Less than one year	104 (74.3%)	76 (63.9%)	36 (35.6%)	3 (12.0%)
Older than one year	26 (18.6%)	26 (21.8%)	36 (35.6%)	5 (20.0%)
Older than three years	6 (4.3%)	11 (9.2%)	14 (13.9%)	5 (20.0%)
Older than five years	4 (2.9%)	6 (5.0%)	15 (14.9%)	12 (48.0%)
Total	140 (100.0%)	119 (100.0%)	101 (100.0%)	25 (100.0%)

p. < .001

POTENTIAL USE OF ENVIRONMENTALLY-FRIENDLY PEST CONTROL COMPANY

How likely are you to Hire an Environmentally Friendly Pest Control Company?

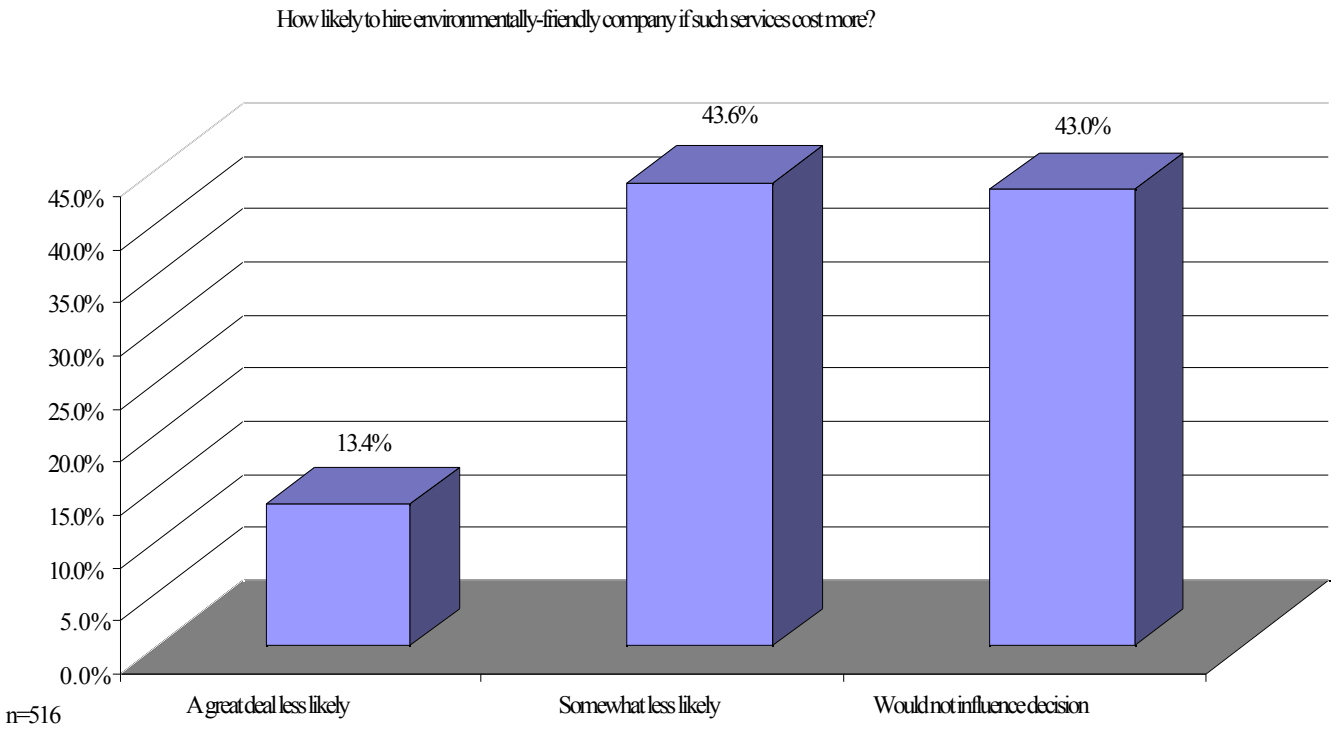
All survey participants were asked how likely they would be to hire a pest control company or professional that uses methods that pose less risk to the environment. As depicted by the graph on the next page, just under one-half (n=716, 49.1%) of the 1,457 respondents that supplied an answer indicated that they would be "not at all likely." An additional 198 respondents (13.6%) reported that they would be "somewhat unlikely." An almost equal proportion of the respondents indicated that they would be "somewhat likely" (17.2%) or "very likely" (20.0%) to hire a company that poses less risk to the environment. Of the 1,603 respondents surveyed, 146 (9.1%) did not supply an answer.



Respondents that indicated that they were either "somewhat likely" or "very likely" (n=543) to hire an environmentally friendly company or professional were asked a series of questions to determine the extent to which their likelihood of hiring such a company was affected by factors such as cost, a slower method, and the necessity for more follow-up visits.

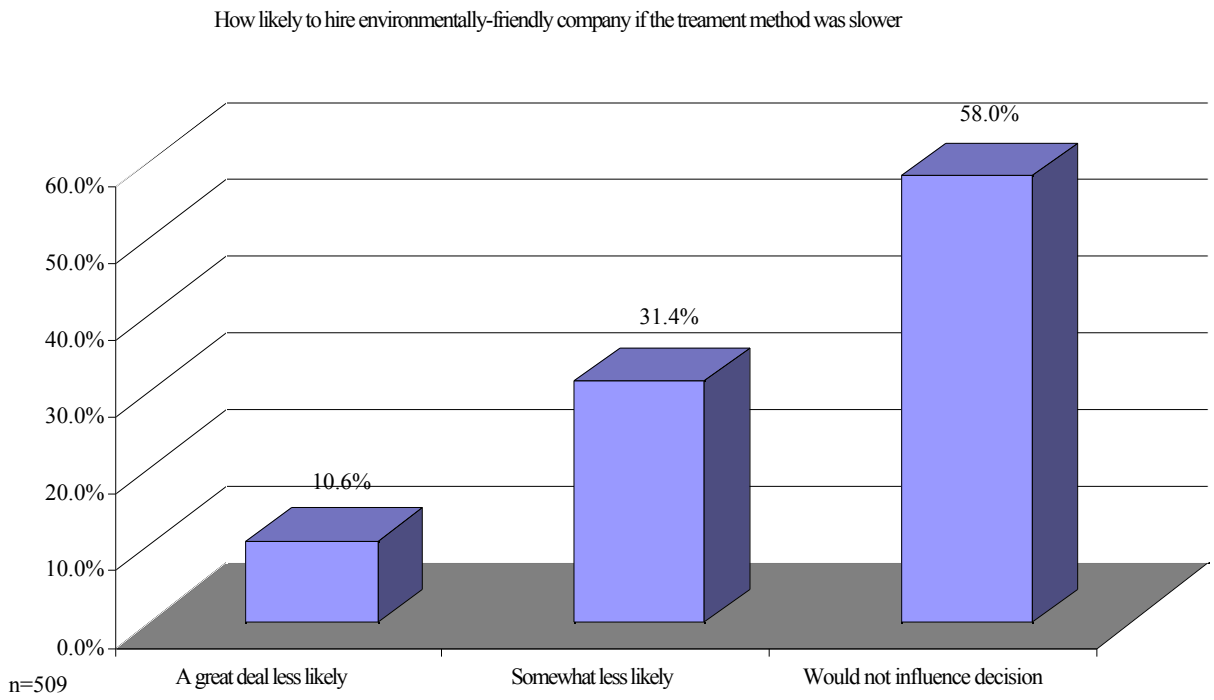
How likely if Services Cost More?

As depicted by the graph on the following page, almost equal proportions of respondents indicated that they would be "somewhat less likely" (n=225, 43.6%) and that it would "not influence their decision" (n=222, 43.0%) to hire an environmentally-friendly company or professional if the services cost more. Only 69 (13.4%) respondents indicated that they would be "a great deal less likely." Twenty-seven respondents did not answer the question; percentages are computed on 516 valid responses.



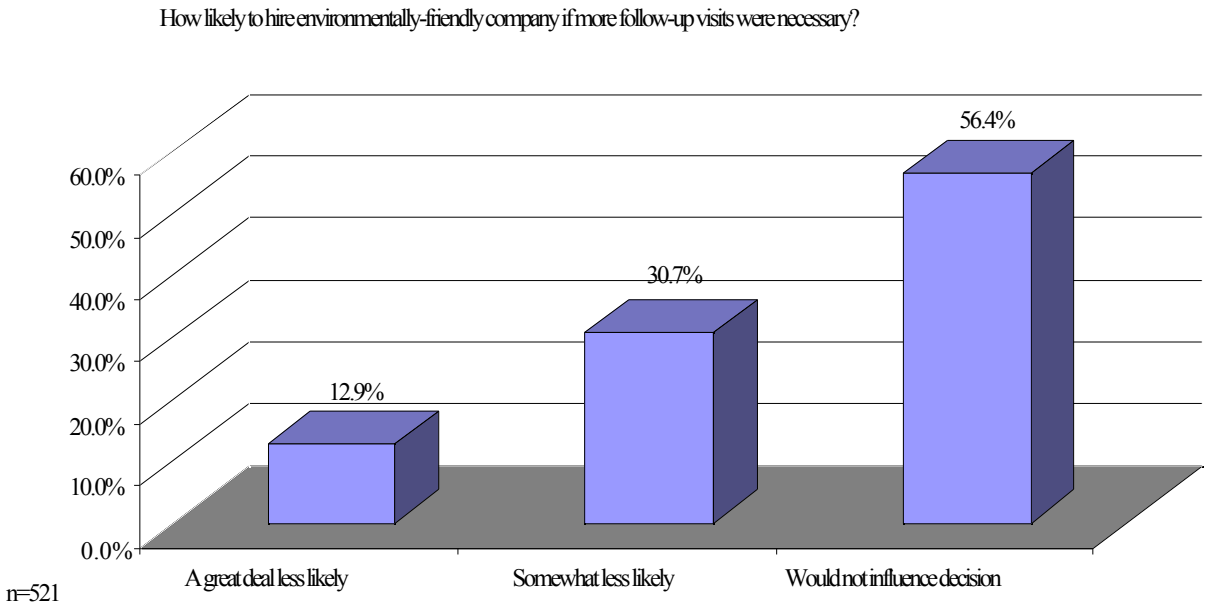
How Likely if Treatment Method was Slower?

Of the 509 valid responses, over one-half (58.0%) indicated that it would not influence their decision to hire an environmentally-friendly company or professional if the treatment method was slower. Only 54 (10.6%) respondents indicated that they would be "a great deal less likely" to hire such a company. These survey responses are depicted by the graph on the following page.



How Likely if More Follow-up Visits were Necessary?

Similar to results depicted above, over one-half of survey respondents (n=294, 56.4%) indicated that it would not influence their decision if more follow-up visits were necessary. However, 160 (30.7%) respondents indicated that they would be "a great deal less likely" and 67 (12.9%) would be "somewhat less likely" to hire an environmentally friendly company if more follow-up visits were necessary. Twenty-two respondents did not answer the question.

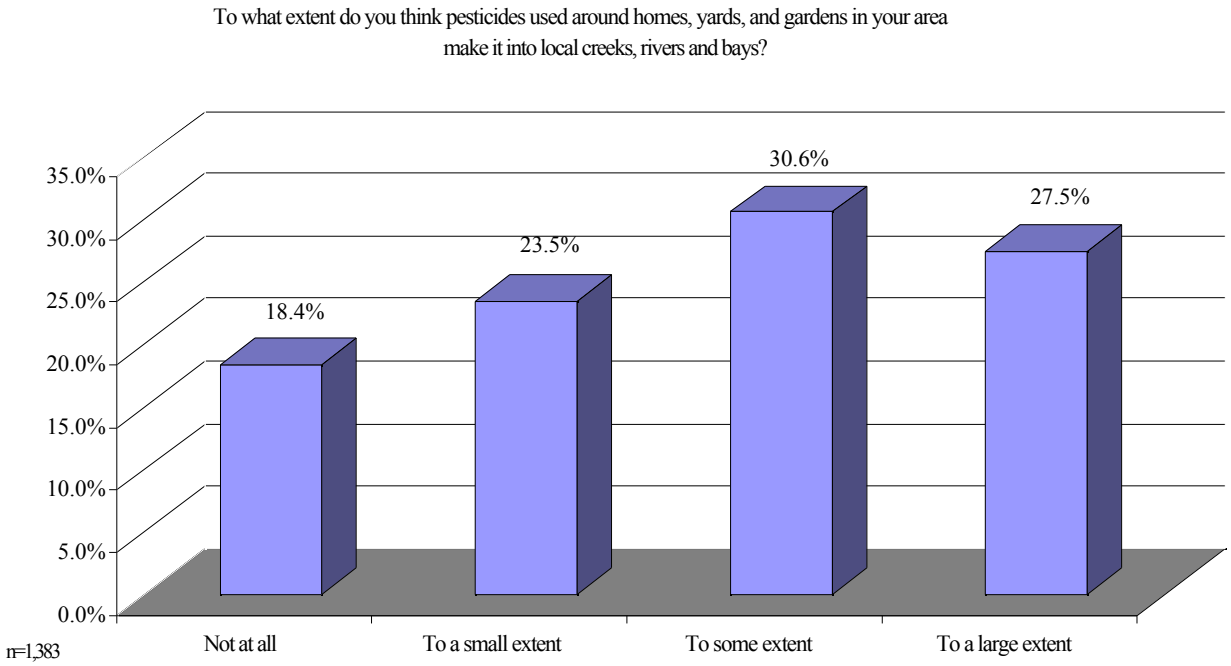


Pesticides And Water Quality

All survey respondents were asked several questions regarding their beliefs about the relationship between pesticide use and water quality, and their knowledge about public services advertisements regarding these issues.

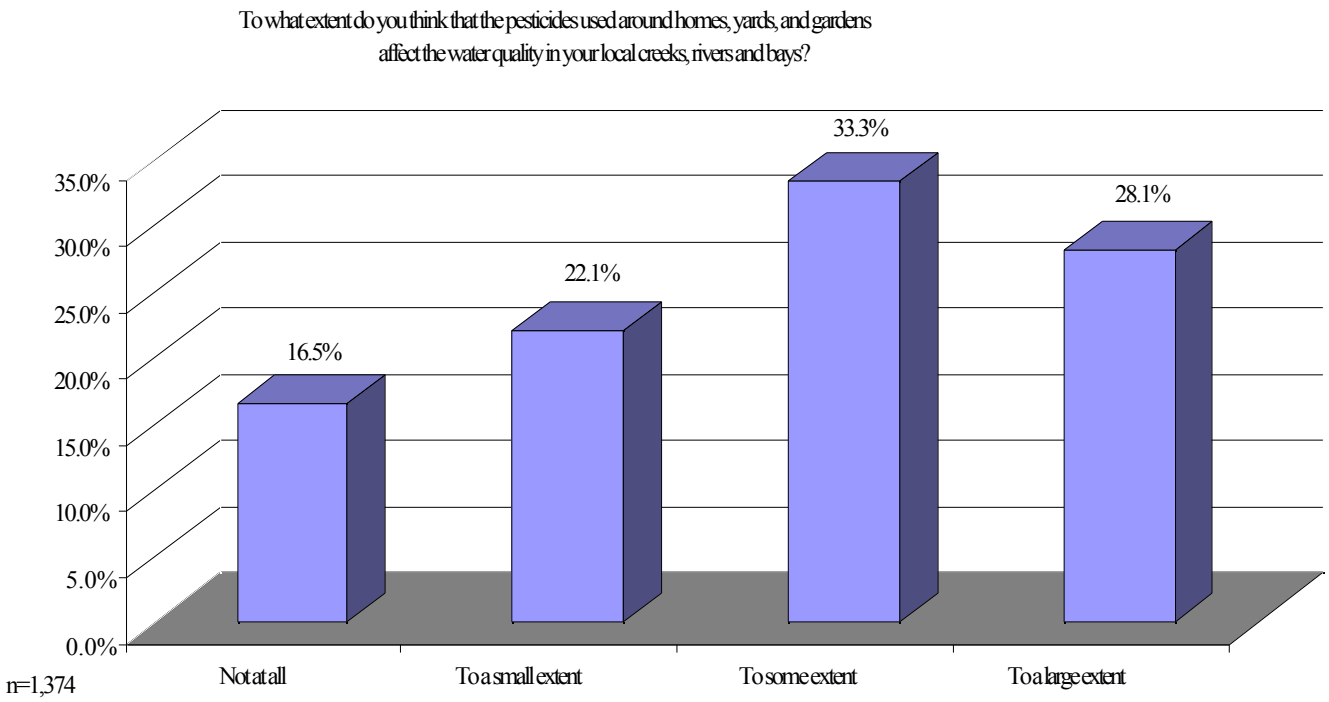
Extent to Which Pesticides Make it Into Local Creeks, Rivers and Bays

As detailed in the graph below, of the 1,383 respondents that supplied an answer, 18.4% responded "not at all" to the question, "To what extent do you think pesticides used around homes, yards, and gardens in your area make it into local creeks, rivers and bays?" Of the valid responses, 325 (23.5%) responded "to a small extent," 423 (30.6%) responded "to a some extent," and 381 (27.5%) responded "to a large extent." Of the 1,603 residents asked, 222 (13.8%) did d not answer the question.



Extent to Which Pesticides Affect Water Quality in Local Creeks, Rivers and Bays

Similar to the distribution of responses presented above, one-third (33.3%) of respondents indicated that they believed "to some extent" that pesticides used around homes, yards and gardens affect the water quality in their local creeks, rivers, and bays. This is followed by 386 (28.1%) that indicated "to a large extent" and 303 (22.1%) that indicated "to a small extent." The smallest proportion (16.5%) indicated "not at all." Of the 1,603 respondents surveyed, 14.3% of the total sample (n=229) did not provide a response. All valid survey responses are detailed in the graph on the following page.



Awareness of Water Quality Posters, Brochures, or Billboards

Of the 1,603 survey respondents questioned, 631 (40.1%) indicated that they had heard or seen something in the media or on posters, brochures, or billboards about pesticide use and water quality within the last year or so and 941 (59.9%) had not. Thirty-one respondents did not know. The 631 that had seen or heard something were asked to describe what they heard or saw and also to describe the source of the information. Of these 631 respondents, 500 (79.2%) were able to describe the informational message and/or the source of the information.

Please Describe What you Heard or Saw

Of the 500 respondents, 174 (34.8%) were unable to describe the message that they saw or heard regarding pesticide use and water quality. Table 44 on the following page details the responses of the 326 respondents that provided an answer. The largest proportion (n=61, 12.2%) indicated that they had heard or seen general messages about water quality and pollution, followed by 51 (10.2%) respondents that had heard or seen a public service announcement that water runoff or dumping contaminates rivers and creeks; 41 (8.2%) respondents have seen images of fish next to street gutters and/or warnings that storm drains lead to the ocean or other bodies of water. All valid survey responses are presented in Table 44 on the next page. Answers provided by respondents were extremely varied.

Table 44

Message Regarding Pesticide Use and Water Quality	Frequency	Percent
General water quality/pollution	61	12.2%
Water runoff or dumping contaminates rivers and creeks	51	10.2%
Images of fish next to street gutters/ Warnings that storm drains lead to the ocean or other bodies of water	41	8.2%
Chemicals/ Pesticides negatively affect water	36	7.2%
Advertisements against pouring pesticides down drains or street gutters	24	4.8%
Chemicals/ Pesticides negatively affect fish/ animals	19	3.8%
Dispose of waste properly	14	2.8%
Other	80	16.0%
Total	326	100.0%

Source of this Information

Respondents were also asked for the source of the message regarding pesticide use and water quality regardless of their ability to describe the message that they had heard or seen; 61 (12.2%) were unable to do so. As detailed in Table 45 below, of the 439 respondents that could identify a source, 122 (27.7%) indicated that they saw a message related to pesticides and water quality on television, followed by 177 (26.6%) that saw or read a message in the newspaper, and 46 (10.4%) that read or saw such a message on signs around the community.

Table 45

Information Source	Frequency	Percent
Television	122	27.7%
Newspaper	117	26.6%
Signs around the community	46	10.4%
Pamphlets and fliers sent in mail	27	6.1%
Billboard	26	5.9%
Radio	22	5.0%
News – Unspecified	13	2.9%
Magazine	10	2.2%
Commercials/ Advertisements – Unspecified	3	.6%
Other	46	10.4%
Total	439	100.0%

Have you done anything differently in response to this information?

Of the 631 respondents asked, 174 (28.0%) indicated that they have done something in response to the information and 448 (72.0%) have not. Nine respondents did not answer the question. Table 46 below details the responses for the 174 respondents that took action in

response to the information that they saw or heard. As shown, almost equal proportions of respondents indicated that they cut back on their use of pesticides (15.5%) and are more cautious or careful about the application and disposal of pesticides (13.2%). These are followed closely by 18 (10.3%) respondents that "do not use harmful products," and 17 (9.8%) that are more cautious or careful in general. Fourteen (8.0%) respondents reported that they are more careful about their drinking water and fourteen "do not use pesticides". Responses categorized as "other" include buying more organic produce and disposing of leftover medication properly. All valid responses are detailed in the Table below.

Table 46

Specify change made in response to information	Frequency	Percent
Cut back on use of pesticides	27	15.5%
More cautious/careful about application/disposal of pesticides	23	13.2%
Don't use harmful products	18	10.3%
Cautious/careful in general	17	9.8%
More careful about drinking water	14	8.0%
Do not use pesticides	14	8.0%
More cautious/careful about purchase of pesticides	13	7.5%
Do not dump harmful chemicals in street or drain	13	7.5%
Took political or community action	4	2.3%
Informed Others	3	1.7%
Don't allow water to run or drip	2	1.1
Other	26	14.9%
Total	174	100%

APPENDIX A

Arcade Creek (Sacramento), and Five Mile Slough (Stockton)

Residential Pest Control Product Use and Disposal Questionnaire
FINAL September 27, 2002

SHELLO Hello, my name is _____and I'm calling from the Social Science Research Center at California State University, Fullerton. Have I reached [READ RESPONDENT'S TELEPHONE NUMBER]?

INTRO1 We're calling on behalf of the University of California, Cooperative Extension to collect information on the use and disposal of pest control products such as pesticides. This is an important scientific study, not a sales call.

ZIPVER We're contacting households that we think are included in the study area, so may we verify that your zip code is [READ ZIP CODE]

1. CORRECT [SKIPTO ZIP SCREEING]
2. INCORRECT [CONTINUE]

ZIPREAL May we please have your correct zip code?

ZIP CODE>
99998. DK/NR
99999. REFUSED
[IF ZIPCODE= 95610, 95621 or 95841 SKIPTO HOUSE]

[ASK IF ZIPCODE= 95207]
ZIP1 Do you live East or West of Pershing Avenue, East is toward West Lane, and West is toward I-5?

1. EAST [CONTINUE TO EPERSH]
2. WEST [SKIPTO WPERSH]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

EPERSH And do you live North of Swain Road, that is North of Sherwood Mall?

1. YES [SKIPTO HOUSE]
2. NO [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

WPERSH And do you live North of West Swain Road, that is, toward the Golf Course?

1. YES [SKIPTO HOUSE]
2. NO [NOT QUALIFIED]
   7. DK/NR [UNSURE]
   9. REFUSED [UNSURE]

[ASK IF ZIPCODE= 95219]

ZIP4 Do you live South of Hammer Lane?

1. YES [CONTINUE TO MILEDIST]
2. NO [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

MILEDIST Do you live within one quarter of a mile West of I-5, the side toward Lake Lincoln and North Lake?

1. YES [SKIPTO HOUSE]
2. NO [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

[ASK IF ZIPCODE= 95608]

ZIP5 Do you live East or West of Manzanita Avenue? East of Manzanita is the side toward Folsom and West is toward Sacramento.

1. EAST [CONTINUE]
2. WEST [SKIPTO WMANZ]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

EMANZ And do you live North of Fair Oaks Boulevard, in other words, the side toward Citrus Heights rather than the side toward Rancho Cordova?

1. YES [SKIPTO HOUSE]
2. NO [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

WMANZ And do you live North of Gibbons Drive, in other words, the side toward Citrus Heights rather than the side toward Rancho Cordova?

1. YES [SKIPTO HOUSE]
2. NO [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

[ASK IF ZIPCODE= 95628]

ZIP6 Do you live East or West of San Juan Avenue? East is toward Folsom and West is toward Sacramento.

1. WEST [SKIPTO HOUSE]
2. EAST [CONTINUE TO NSJA]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

NSJA And do you live North or South of Sunset Avenue? North is toward Citrus Heights and South is toward Rancho Cordova.

1. NORTH [SKIP TO HOUSE]
2. SOUTH [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

[ASK IF ZIPCODE= 95660]

ZIP7 Do you live South of Madison Avenue, the side toward Sacramento (Haggin Oaks Municipal Golf Course), rather than the side toward North Highlands?

1. YES [SKIPTO HOUSE]
2. NO [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

[ASK IF ZIPCODE= 95662]

ZIP8 Do you live East or West of Hazel Avenue? East is the side toward Folsom, and West is the side toward Citrus Heights.

1. EAST [NOT QUALIFIED]
2. WEST [CONTINUE]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

OAK And do you live South of Oak Avenue, the side toward the American River rather than the side toward Roseville?

1. YES [SKIPTO HOUSE]
2. NO [NOT QUALIFIED]
7. DK/NR [UNSURE]

9. REFUSED [UNSURE]

[ASK IF ZIPCODE= 95815]
ZIP9 Do you live North or South of El Camino Avenue? North is the side toward McClellan Air Force Base (now McClellan Business Park) rather than the side toward Sacramento.

1. NORTH [SKIPTO HOUSE]
2. SOUTH [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

[ASK IF ZIPCODE= 95821]
ZIP10 Do you live North or South of Whitney Avenue? North is the side toward North Highlands and South is the side toward the American River

1. NORTH [SKIPTO HOUSE]
2. SOUTH [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

[ASK IF ZIPCODE= 95838]
ZIP11 Do you live North or South of Interstate 80? North is the side toward Rio Linda and South is the side toward Cal Expo/Arden Fair Mall?

1. NORTH [NOT QUALIFIED]
2. SOUTH [SKIPTO HOUSE]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

[ASK IF ZIPCODE= 95842]
ZIP12 Do you live North or South of Elkhorn Boulevard? North of Elkhorn is the side toward Antelope Rd and South is toward Madison Ave.

1. NORTH [CONTINUE]
2. SOUTH [SKIPTO SELKHORN]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

NELKHORN And do you live East of Don Julio Boulevard, in other words, the side toward Interstate 80 rather than the side toward McClellan Air Force Base (now McClellan Business Park)?

1. YES [SKIPTO HOUSE]
2. NO [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

SELKHORN And do you live East of Hillsdale Boulevard, in other words, the side toward Interstate 80 rather than the side toward McClellan Air Force Base (now McClellan Business Park)?

1. YES [CONTINUE]
2. NO [NOT QUALIFIED]
7. DK/NR [UNSURE]
9. REFUSED [UNSURE]

[IF ZIPCODE != LIST, RESPONDENT IS NOT QUALIFIED]

HOUSE The type of residence that you live in is relevant to questions about pest control. Do you live in a…

1. Single family detached home [SKIP TO WHO]
2. Attached home such as a condo or townhouse [CONTINUE ONLY
3. Apartment (DUPLEX, STUDIO, ETC.) TO FILL QUOTA]
4. Mobile home
5. OTHER (Specify: _____)
7. DON'T KNOW
9. REFUSED

QUOTA Thanks so much for your patience with our procedures. We're interviewing only persons that reside in single family detached homes at this time. Goodbye.

WHO To gain an understanding of residential pest control practices in your area, would you please tell us who at your residence applies outdoor pest control products?

1. Yourself [SKIPTO INTRO2]
2. Another member of your household [CONTINUE]
3. Commercial company, apartment complex or Home-owners' Association not directly contracted by you or your family [SKIPTO INTRO2]
4. Yourself and a pest control company that you

contract with directly [SKIPTO INTRO2]
5. Only a pest control company that you contract with directly [SKIPTO INTRO2]
6. Property Owner or Landlord [SKIPTO INTRO2]
7. Other (Please specify), or would you say, [SKIPTO INTRO2]
8. No outdoor pest control products are applied at your residence
9. DK/NR [SKIPTO INTRO2]
10. REFUSED [SKIPTO INTRO2]

WHO2 May we please speak to that person or to someone who knows about the application of pest control products at your residence?

1. YES [SKIPTO INTRO2]
2. NO [CONTINUE]

CALLBAK1 Can you please tell me when to call back to reach the person that knows about the application of pest control products at your residence?

SCHEDULE CALLBACK

INTRO2 We are conducting a scientific study to learn about residents' use of pest control products. This survey is important and it takes less than ten minutes to complete. Your identity and your responses will remain completely anonymous and confidential, and of course, you are free to decline to answer any survey question. I should also mention that this call may be monitored by my supervisor for quality control purposes only.

Is it all right to ask you these questions now?

1. YES [SKIPTO OFAGE]
2. NO [CONTINUE]

APPT When may we call back to ask you the survey questions?

OFAGE May we please verify that you are eighteen years of age or older?

[IF WHO = 1 OR 2, SKIPTO NOPRO]
1. YES [IF WHO = 4 OR 5 SKIPTO WPESTS]
2. NO [IF WHO = 3, 6-9, SKIPTO TRANS1]
7. DK/NR
9. REFUSED

OFAGE2 May we please speak to someone who is over 18, that knows about the application of pest control products at your residence?

1. YES
2. NO [SCHEDULE CALLBACK]

[ASK ONLY IF WHO EQUALS 4 OR 5]

WPESTS May I begin by asking what pests prompted you to hire a professional pest control company?
[SELECT ALL THAT APPLY]

1. ANTS
2. COCKROACHES
3. RATS OR MICE
4. TERMITES
5. WASPS, BEES, OR STINGING INSECTS
6. OTHER (SPECIFY)
7. DK/NR
8. REFUSED
9. EXIT

WHYHIR Why did you decide to hire a professional pest control company?
[CHECK ALL THAT ARE MENTIONED]

1. EXPERTISE
2. CONVENIENCE
3. SAFETY
4. A GUARANTEE IS PROVIDED
5. SERIOUSNESS OF PROBLEM
6. APPLICATION OF PRODUCTS BY SELF FAILED
7. OTHER SPECIFY>
8. DK/NR
9. REFUSED
10. EXIT

CONTR Is this a contract service involving scheduled repeat visits, or do you use the service as needed, or on an on-call basis?

1. SCHEDULED REPEAT VISITS
2. AS NEEDED OR ON-CALL BASIS
7. DK/NR
9. REFUSED

WHRAPP Where did/ does the professional apply pesticides?
[CHECK ALL THAT APPLY]

1. Hard Surfaces, like the building perimeter, base of buildings, pet enclosures, driveways, sidewalks, patios or walls;
2. Lawns or turf;
3. Ornamental Landscaping, like flowers, shrubs or trees;
4. Food plants, like fruit trees, tomatoes, or garden vegetables;
5. Other (Specify)
6. DK/NR
7. REFUSED
8. EXIT

WHTAPP Do you know what pesticide the professional pest control company applied?

1. YES (Specify)
2. NO
7. DK/NR
9. REFUSED

[ASK ONLY IF WHO EQUALS 1 OR 2]
NOPRO May I begin by asking why you don't hire a professional pest control company?
[CHECK ALL THAT ARE MENTIONED]

1. I HAVE SUFFICIENT EXPERTISE
2. I CAN APPLY PEST CONTROL PRODUCTS SAFELY
3. PEST PROBLEMS ARE NOT SERIOUS ENOUGH
4. APPLICATION OF PRODUCTS BY SELF HAS BEEN SUCCESSFUL OR WORKS JUST AS WELL
5. TOO EXPENSIVE
6. OTHER SPECIFY>
7. DK/NR
8. REFUSED
9. EXIT

TRANS1 We'd like to continue with some questions about your MAIN outdoor pest problems.

Q1 First, are insects a major OUTDOOR problem around your residence?
[ANTS, WHITEFLIES, CATERPILLARS, FLIES, APHIDS, SPIDERS, SCALE, SOWBUGS]
[SELECT ALL THAT APPLY]

1. ANTS
2. COCKROACHES
3. SPIDERS
4. FLEAS
5. FLIES
6. TERMITES
7. WHITEFLIES
8. OTHER SPECIFY>

9. NO, OUTDOOR PESTS ARE NOT A PROBLEM
10. DK/NR
11. REFUSED
12. EXIT

Q2 Are weeds a major problem around your residence?
[DANDELION, BERMUDA GRASS, CRABGRASS, SPURGE, WOODSORREL, CLOVER, WEEDS YOU ARE UNABLE TO IDENTIFY]

1. YES (Specify)
2. NO
7. DK/NR
9. REFUSED

Q3 Are plant diseases a major OUTDOOR problem around your residence?
[BLACK SPOTS, MILDEW, DIEBACK]

1. YES (Specify)
2. NO
7. DK/NR
9. REFUSED

Q4 Are snails or slugs a major problem around your residence?

1. YES
2. NO
7. DK/NR
9. REFUSED

Q5 Are birds, rabbits, squirrels, rats or mice, gophers, raccoons or deer a major problem around your residence?

1. YES (Please specify)
2. NO
7. DK/NR
9. REFUSED

Q6 How do you identify outdoor pest problems? How do you know what they are? Would you say that you…
[SELECT ALL THAT APPLY]

1. Can identify them from experience
2. Guess
3. Identify them using a book, magazine, or Internet (Specify?)
4. Receive help from store personnel,

5. Other (Please specify), or would you say that you..
6. Don't know what outdoor pest problems you have?
7. NO RESPONSE
8. REFUSED
9. EXIT

[IF WHO=3 OR WHO >=5 SKIPTO Q10A]

Q7 In the last 6 months, that is, since [MONTH NAME SIX MONTHS PRIOR], have you used any OUTDOOR pest control products at your residence?

1. YES
2. NO [SKIPTO Q10]
7. DK/NR [SKIPTO Q10]
9. REFUSED [SKIPTO Q10]

HOWMANY In the last six months, how many different OUTDOOR pest control products have you used at your residence?

NUMBER OF PRODUCTS>
7. DK/NR
9. REFUSED

TRANS2 First, we're going to ask you for the names of the OUTDOOR pest control products that you've used at your residence. Then we will ask a few questions regarding each product.

Q8A What is the name of the [FIRST PRODUCT]?
[ACCEPT RESPONSES FOR UP TO SIX PRODUCTS]

PRODUCT 1>

Q8B PRODUCT 2>
Q8C PRODUCT 3>
Q8D PRODUCT 4>
Q8E PRODUCT 5>
Q8F PRODUCT 6>

[ASK Q9A THROUGH Q9D FOR EACH PRODUCT USED]

Q9A What did you use [FIRST PRODUCT] for? (for example, insects, weeds, plant disease, snails, etc.)

OPN>

Q9B What form of [FIRST PRODUCT] did you use? Was it a…

1. Ready-to-use spray [CONTINUE]

2. Concentrated spray you must add water to [ALL OTHERS SKP Q9C]
3. Dry granule
4. Dust
5. Enclosed baits, like ant stakes or plastic housings with bait inside
6. Other (Specify)
7. DK/NR
9. REFUSED

Q9B1 Was the ready-to-use spray in an aerosol can, or a squirt bottle with a manual pump?

1. AEROSOL CAN
2. SQUIRT BOTTLE, MANUAL PUMP
7. DK/ NR
9. REFUSED

Q9C Where did you purchase [FIRST PRODUCT]?
[READ RESPONSES ONLY IF NECESSARY]

1. Large home supply store (Specify name of store, e.g. Home Depot)
2. Discount department store (Specify name of store, e.g. Target)
3. Grocery or drug store (Specify name of store)
4. Nursery (Specify name of store)
5. Hardware store (Specify name of store)
6. By catalog or Internet (Specify name of seller)
7. Other (Please specify)
8. DK/NR
9. REFUSED

Q9D Where was it applied?
[CHECK ALL THAT APPLY]

1. Hard Surfaces, like the building perimeter, base of buildings, pet enclosures, driveways, sidewalks, patios or walls,
2. Lawns or turf,
3. Ornamental Landscaping, like flowers, shrubs or trees,
4. Food plants, like fruit trees, tomatoes, or garden vegetables
5. Other (Specify)
6. DK/NR
7. REFUSED
8. EXIT

Q10 Thinking of all the OUTDOOR pest control products you ever use, what is the total number of times you apply them per year?

1. Less than 1 time per year
2. 1-3 times per year
3. 4-6 times per year
4. 7-12 times per year

5. More than 12 times per year
7. DK/NR
9. REFUSED

Q10A How familiar are you with the West Nile Virus? Would you say that you are…

1. Not at all familiar [SKIPTO Q11]
2. Not very familiar [CONTINUE]
3. Somewhat familiar, or [CONTINUE]
4. Very familiar with the West Nile Virus [CONTINUE]
7. DK/NR
9. REFUSED

Q10B In the last six months, that is since [MONTH], has your use of OUTDOOR pest control products changed, in any way, because of this virus?

1. YES, Please explain how your use of pest control products has changed
2. NO
7. DK/NR
9. REFUSED

[IF WHO=3 OR WHO >=5 SKIPTO HOWLIK]

Q11 For OUTDOOR pest control products that must be mixed with water before using, what do you do with the leftover solution?
[DO NOT READ—SELECT ALL THAT APPLY]

1. POUR DOWN THE DRAIN OR TOILET INSIDE YOUR HOUSE
2. POUR DOWN THE DRAIN OUTSIDE YOUR HOUSE
3. POUR IN THE STREET OR GUTTER
4. POUR ON THE LAWN OR IN ANOTHER GARDEN AREA
5. PUT IN THE TRASH
6. TAKE TO A HAZARDOUS WASTE DISPOSAL SITE
7. STORE AND USE LATER
8. APPLY TO OTHER AREAS (PLEASE SPECIFY):_____
9. REAPPLY TO SAME AREA UNTIL USED UP
10. OTHER (SPECIFY)
11. I ONLY MAKE ENOUGH TO USE, THERE IS NO LEFTOVER
12. DON'T USE ANY PRODUCTS THAT MUST BE MIXED WITH WATER
13. DK/NR
14. REFUSED
15. EXIT

Q12 How do you usually dispose of pest control products that you no longer use? [DO NOT READ—SELECT ALL THAT APPLY]

1. POUR DOWN DRAIN OR TOILET INSIDE YOUR HOUSE
2. POUR DOWN DRAIN OUTSIDE YOUR HOUSE
3. POUR IN THE GUTTER OR STREET
4. PUT IN TRASH
5. TAKE TO HAZARDOUS WASTE DISPOSAL SITE
6. GIVE AWAY
7. OTHER (PLEASE SPECIFY)
8. DK/NR
9. REFUSED
10. EXIT

Q13 What are the top two or three things that you consider, or that influence your decision, when you choose a pest control product to use?
[DO NOT READ--SELECT ALL THAT APPLY]

1. HEALTH/HUMAN SAFETY
2. PET SAFETY
3. ACTIVE INGREDIENT
4. COST
5. PACKAGING
6. HOW LONG IT WILL LAST
7. HOW FAST IT WORKS
8. RECOMMENDATION FROM SOMEONE ELSE
9. ENVIRONMENTAL CONCERNS
10. EASE OF APPLICATION
11. CLEARLY WRITTEN INSTRUCTIONS
12. PEST NAME OR PICTURE ON LABEL
13. ALREADY HAVE AT HOME
14. OTHER (PLEASE SPECIFY)
15. DK/NR
16. REFUSED
17. EXIT

Q15 Which of these do you read or look at on a pest control product label BEFORE buying it?
[RANDOMIZE ORDER OF PRESENTATION]
[READ EACH OPTION AND SELECT ALL THAT APPLY]

1. Picture of the pest
2. List of pests it controls
3. Safety information
4. Disposal information
5. How much to use
6. How to apply
7. When to treat
8. What the ingredients are
9. Other (Please specify)
10. DK/NR
11. REFUSED
12. EXIT

Q16 When you apply pest control products, how do you decide how much of the product to use?

1. Read and follow all directions on the container
2. Read directions on container and use them as guidelines
3. Don't read directions; use experience or best estimate
4. Other (Please specify)
7. DK/NR
9. REFUSED

Q17 Do you measure out the amount of pest control product or do you estimate the amount of pest control product to spray or apply?

1. MEASURE
2. ESTIMATE
7. DK/NR
9. REFUSED

Q18 What are the sources of information that influence your decision about what pest control products to buy?
[DO NOT READ -- SELECT ALL THAT APPLY]

1. NEWSPAPER ARTICLES
2. MAGAZINE ARTICLES

3. INTERNET ARTICLES
4. PRODUCT LABELS
5. POSTERS AT STORE WHERE PURCHASED
6. TEAR SHEETS AT STORE WHERE PURCHASED
7. EMPLOYEE AT STORE WHERE PURCHASED
8. OTHER METHOD AT STORE WHERE PURCHASED
9. WORD-OF MOUTH
10. ADVERTISEMENTS
11. CLASSES
12. GARDEN FAIRS/ SHOWS
13. UNIVERSITY OF CALIFORNIA FARM ADVISOR
14. UNIVERSITY OF CALIFORNIA MASTER GARDENER
15. OTHER (PLEASE SPECIFY:_____)
16. DK/NR
17. REFUSED
18. EXIT

Q21 About how many different pest control products are stored in your home?

SPECIFY NUMBER> [IF ANS=0, SKIPTO Q26]
0. NONE
98. DK/NR
99. REFUSED

Q22 About how old is the oldest pest control product you have?

1. Less than 1 year
2. Older than 1 year
3. Older than 3 years
4. Older than 5 years
7. DK/NR
9. REFUSED

Q26 Have you or any member of your household taken materials to a household hazardous waste disposal site near you?

1. YES
2. NO
7. DK/NR
9. REFUSED

[ALL SURVEY RESPONDENTS ARE PICKED UP HERE]

HOWLIK How likely is it that you would hire a pest control company or professional that offers to control pests using methods that pose less risk to the environment? Would you say that you are…?

1. Not at all likely, [SKIP TO WATRQAL1]
2. Somewhat unlikely, [SKIP TO WATRQAL1]
3. Somewhat likely, or [CONTINUE]
4. Very likely to hire a pest control professional that uses more environment-friendly methods?
7. DK/NR
9. REFUSED

TRANSNEW I'm going to read a list of factors that might influence your decision to hire a pest control company or professional that uses environmentally friendly methods. If each one were true, please indicate how likely you would be to hire such a company or professional.

PROFAC1 If such services cost more, would you be...?
PROFAC2 The treatment method was slower, would you be...?
PROFAC2 More follow-up visits were necessary, would you be...?

1. A great deal less likely to hire an environmentally friendly company or professional
2. Somewhat less likely, or
3. Would this factor not influence your decision?
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

WATRQAL1 To what extent do you think pesticides used around homes, yards, and gardens in your area <u>make it into</u> local creeks, rivers and bays?

1. Not at all
2. To a small extent
3. To some extent
4. To a large extent
7. DK/NR
9. REFUSED

WATRQAL2 To what extent do you think that the pesticides used around homes, yards and gardens <u>affects the water quality</u> in your local creeks, rivers and bays?

1. Not at all
2. To a small extent
3. To some extent
4. To a large extent
7. DK/NR
9. REFUSED

INFO Have you heard or seen anything in the media or on posters, brochures, or billboards about pesticide use and water quality in the last year or so?

1. YES [CONTINUE]
2. NO [SKIPTO Q27]
7. DK/NR [SKIPTO Q27]
9. REFUSED [SKIPTO Q27]

INFOSPEC Can you please describe what you heard or saw? Also, can you recall the source of this information?

1. SPECIFY
7. DK/NR
9. REFUSED

RESP Have you done anything differently in response to this information?

1. YES (Please specify)
2. NO
7. DK/NR
9. REFUSED

Q27 Now we'd like to ask some questions regarding your background-- first, what is your age?

AGE> [IF ANSWERED, SKIPTO Q29]
98. DON'T KNOW
99. REFUSED

Q28 In what year were you born?

19__
98. DON'T KNOW
99. REFUSED

Q29 Do you own or rent your home?

1. OWN

2. RENT
7. DK/NR
9. REFUSED

Q30 What is the primary language spoken in the home?

1. ENGLISH	[SKIP TO CITY]
2. SPANISH	[ALL OTHERS CONTINUE]
3. MANDARIN	
4. CANTONESE	
5. OTHER (PLEASE SPECIFY)	
7. DK/NR	[SKIP TO CITY]
9. REFUSED	[SKIP TO CITY]

Q31. What language do you speak?

1. Only [LANG FROM Q30]
2. [LANG FROM Q30] more than English
3. Both equally
4. English more than [LANG FROM Q30]
5. Only English
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

Q32. What language do you read?

1. Only [LANG FROM Q30]
2. [LANG FROM Q30] more than English
3. Both equally
4. English more than [LANG FROM Q30]
5. Only English
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

Q33. In what language are the movies, TV, and radio programs you <u>want</u> to watch or listen to?

1. Only [LANG FROM Q30]
2. [LANG FROM Q30] more than English
3. Both equally

4. English more than [LANG FROM Q30]
5. Only English
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

Q34. With whom do you socialize?

1. All [ADAPT FROM Q30]
2. More [ADAPT FROM Q30] than Non-[ADAPT FROM Q30]
3. Both equally
4. More Non-[ADAPT FROM Q30] than [ADAPT FROM Q30]
5. All Non-[ADAPT FROM Q30]
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

CITY What city do you live in?

1. CARMICHAEL
2. CITRUS HEIGHTS
3. FAIR OAKS
4. NORTH HIGHLANDS
5. ORANGEVILLE
6. SACRAMENTO
7. STOCKTON
8. OTHER
9. REFUSED

CHILDREN Do you have any children under the age of 18 currently living in your residence?

1. YES
2. NO
7. DK/NR
9. REFUSED

Q35 How do you describe your race or ethnicity?

1. Asian (SPECIFY: _____)
2. Black or African American
3. Hispanic or Latino
4. Caucasian or White
5. Bi- or Multi-Racial
6 Other (SPECIFY: _____)
7. DON'T KNOW
9. REFUSED

Q36 What was the last grade in school that you completed?

1. Less than high school diploma/GED
2. High school diploma/GED
3. Some college, no degree
4. Associate degree
5. Bachelor's degree
6. A degree higher than a Bachelor's (i.e. Teaching Credential, Masters, Ph.D., JD)
7. DK/NR
9. REFUSED

Q37 Lastly, please stop me when I reach the category that includes your annual, household income before taxes…

1. Less than $20,000 per year
2. $20,000 - $29,999
3. $30,000 - $39,999
4. $40,000 - $49,999
5. $50,000 - $59,999
6. $60,000 - $69,999
7. $70,000 - $79,999
8. $80,000 - $89,999
9. $90,000 - $99,999
10. $100,000 - $124,999
11. $125,000 - $149,999
12. $150,000 - $174,999
13. More than $175,000
77. DON"T KNOW/ NO RESPONSE
99. REFUSED

CONCLUDE Thank you. That concludes our survey. Your participation is deeply appreciated.

APPENDIX B

BAY AREA
RESIDENTIAL PEST CONTROL PRODUCT USE AND DISPOSAL QUESTIONNAIRE
FINAL TELEPHONE INSTRUMENT

SHELLO Hello, my name is _____and I'm calling from the Social Science Research Center at California State University, Fullerton. Have I reached [READ RESPONDENT'S TELEPHONE NUMBER]?

INTRO1 We're calling on behalf of the University of California, Cooperative Extension to collect information on the use and disposal of pest control products such as pesticides. This is an important scientific study, not a sales call.

ZIPVER We're contacting households that we think are included in the study area, so may we verify that your zip code is [READ ZIP CODE]

3. CORRECT [SKIPTO ZIP SCREEING]
4. INCORRECT [CONTINUE]

ZIPREAL May we please have your correct zip code?

ZIP CODE>
99998. DK/NR
99999. REFUSED
[IF ZIPCODE != LIST, RESPONDENT IS NOT QUALIFIED]

HOUSE The type of residence that you live in is relevant to questions about pest control. Do you live in a…

1. Single family detached home [SKIP TO WHO]
2. Attached home such as a condo or townhouse [CONTINUE ONLY
3. Apartment (DUPLEX, STUDIO, ETC.) TO FILL QUOTA]
4. Mobile home
5. OTHER (Specify: _____)
7. DON'T KNOW
9. REFUSED

QUOTA Thanks so much for your patience with our procedures. We're interviewing only persons that reside in single family detached homes at this time. Goodbye.

WHO To gain an understanding of residential pest control practices in your area, would you please tell us who at your residence applies outdoor pest control products?

6. Yourself [SKIPTO INTRO2]
7. Another member of your household [CONTINUE]
8. Commercial company, apartment complex or Home-owners' Association not directly contracted by you or your family [SKIPTO INTRO2]
9. Yourself and a pest control company that you contract with directly [SKIPTO INTRO2]
10. Only a pest control company that you contract with directly [SKIPTO INTRO2]
6. Property Owner or Landlord [SKIPTO INTRO2]
10. Other (Please specify), or would you say, [SKIPTO INTRO2]
11. No outdoor pest control products are applied at your residence
12. DK/NR [SKIPTO INTRO2]
10. REFUSED [SKIPTO INTRO2]

WHO2 May we please speak to that person or to someone who knows about the application of pest control products at your residence?

3. YES [SKIPTO INTRO2]
4. NO [CONTINUE]

CALLBAK1 Can you please tell me when to call back to reach the person that knows about the application of pest control products at your residence?

SCHEDULE CALLBACK

INTRO2 We are conducting a scientific study to learn about residents' use of pest control products. This survey is important and it takes less than ten minutes to complete. Your identity and your responses will remain completely anonymous and confidential, and of course, you are free to decline to answer any survey question. I should also mention that this call may be monitored by my supervisor for quality control purposes only.

Is it all right to ask you these questions now?

1. YES [SKIPTO OFAGE]
2. NO [CONTINUE]

APPT When may we call back to ask you the survey questions?

OFAGE May we please verify that you are eighteen years of age or older?

[IF WHO = 1 OR 2, SKIPTO NOPRO]

1. YES [IF WHO = 4 OR 5 SKIPTO WPESTS]
2. NO [IF WHO = 3, 6-9, SKIPTO TRANS1]
7. DK/NR
9. REFUSED

OFAGE2 May we please speak to someone who is over 18, that knows about the application of pest control products at your residence?

1. YES
2. NO [SCHEDULE CALLBACK]

[ASK ONLY IF WHO EQUALS 4 OR 5]

WPESTS May I begin by asking what pests prompted you to hire a professional pest control company?
[SELECT ALL THAT APPLY]

1. ANTS
2. COCKROACHES
3. RATS OR MICE
4. TERMITES
5. WASPS, BEES, OR STINGING INSECTS
6. OTHER (SPECIFY)
7. DK/NR
10. REFUSED
11. EXIT

WHYHIR Why did you decide to hire a professional pest control company?
[CHECK ALL THAT ARE MENTIONED]

11. EXPERTISE
12. CONVENIENCE
13. SAFETY
14. A GUARANTEE IS PROVIDED
15. SERIOUSNESS OF PROBLEM
16. APPLICATION OF PRODUCTS BY SELF FAILED
17. OTHER SPECIFY>
18. DK/NR
19. REFUSED
20. EXIT

CONTR Is this a contract service involving scheduled repeat visits, or do you use the service as needed, or on an on-call basis?

3. SCHEDULED REPEAT VISITS
4. AS NEEDED OR ON-CALL BASIS
7. DK/NR
9. REFUSED

WHRAPP Where did/ does the professional apply pesticides?
[CHECK ALL THAT APPLY]

1. Hard Surfaces, like the building perimeter, base of buildings, pet enclosures, driveways, sidewalks, patios or walls;
2. Lawns or turf;
3. Ornamental Landscaping, like flowers, shrubs or trees;
4. Food plants, like fruit trees, tomatoes, or garden vegetables;
9. Other (Specify)
10. DK/NR
11. REFUSED
12. EXIT

WHTAPP Do you know what pesticide the professional pest control company applied?

3. YES (Specify)
4. NO
7. DK/NR
9. REFUSED

[ASK ONLY IF WHO EQUALS 1 OR 2]
NOPRO May I begin by asking why you don't hire a professional pest control company?
[CHECK ALL THAT ARE MENTIONED]

10. I HAVE SUFFICIENT EXPERTISE
11. I CAN APPLY PEST CONTROL PRODUCTS SAFELY
12. PEST PROBLEMS ARE NOT SERIOUS ENOUGH
13. APPLICATION OF PRODUCTS BY SELF HAS BEEN SUCCESSFUL OR WORKS JUST AS WELL
14. TOO EXPENSIVE
15. OTHER SPECIFY>
16. DK/NR
17. REFUSED
18. EXIT

TRANS1 We'd like to continue with some questions about your MAIN outdoor pest problems.

Q1 First, are insects a major OUTDOOR problem around your residence?
[ANTS, WHITEFLIES, CATERPILLARS, FLIES, APHIDS, SPIDERS, SCALE, SOWBUGS]
[SELECT ALL THAT APPLY]

1. ANTS
2. COCKROACHES
3. SPIDERS
4. FLEAS
5. FLIES
6. TERMITES
7. WHITEFLIES
8. OTHER SPECIFY>
9. NO, OUTDOOR PESTS ARE NOT A PROBLEM
10. DK/NR
11. REFUSED
12. EXIT

Q2 Are weeds a major problem around your residence?
[DANDELION, BERMUDA GRASS, CRABGRASS, SPURGE, WOODSORREL, CLOVER, WEEDS YOU ARE UNABLE TO IDENTIFY]

1. YES (Specify)
2. NO
7. DK/NR
9. REFUSED

Q3 Are plant diseases a major OUTDOOR problem around your residence?
[BLACK SPOTS, MILDEW, DIEBACK]

3. YES (Specify)
4. NO
7. DK/NR
9. REFUSED

Q4 Are snails or slugs a major problem around your residence?

3. YES
4. NO
7. DK/NR
9. REFUSED

Q5 Are birds, rabbits, squirrels, rats or mice, gophers, raccoons or deer a major problem around your residence?

3. YES (Please specify)
4. NO
7. DK/NR
9. REFUSED

Q6 How do you identify outdoor pest problems? How do you know what they are? Would you say that you…
[SELECT ALL THAT APPLY]
7. Can identify them from experience
8. Guess
9. Identify them using a book, magazine, or Internet (Specify?)
10. Receive help from store personnel,
11. Other (Please specify), or would you say that you..
12. Don't know what outdoor pest problems you have?
7. NO RESPONSE
8. REFUSED
9. EXIT

[IF WHO=3 OR WHO >=5 SKIPTO Q10A]
Q7 In the last 6 months, that is, since [MONTH NAME SIX MONTHS PRIOR], have you used any OUTDOOR pest control products at your residence?

13.	YES	
14.	NO	[SKIPTO Q10]
7.	DK/NR	[SKIPTO Q10]
9.	REFUSED	[SKIPTO Q10]

HOWMANY In the last six months, how many different OUTDOOR pest control products have you used at your residence?

NUMBER OF PRODUCTS>
7. DK/NR
9. REFUSED

TRANS2 First, we're going to ask you for the names of the OUTDOOR pest control products that you've used at your residence. Then we will ask a few questions regarding each product.

Q8A What is the name of the [FIRST PRODUCT]?
[ACCEPT RESPONSES FOR UP TO SIX PRODUCTS]

PRODUCT 1>
Q8B PRODUCT 2>
Q8C PRODUCT 3>
Q8D PRODUCT 4>
Q8E PRODUCT 5>
Q8F PRODUCT 6>

[ASK Q9A THROUGH Q9D FOR EACH PRODUCT USED]
Q9A What did you use [FIRST PRODUCT] for? (for example, insects, weeds, plant disease, snails, etc.)

OPN>

Q9B What form of [FIRST PRODUCT] did you use? Was it a…

7. Ready-to-use spray [CONTINUE]
8. Concentrated spray you must add water to [ALL OTHERS SKP Q9C]
9. Dry granule
10. Dust
11. Enclosed baits, like ant stakes or plastic housings with bait inside
12. Other (Specify)
7. DK/NR
9. REFUSED

Q9B1 Was the ready-to-use spray in an aerosol can, or a squirt bottle with a manual pump?

1. AEROSOL CAN
2. SQUIRT BOTTLE, MANUAL PUMP
7. DK/ NR
9. REFUSED

Q9C Where did you purchase [FIRST PRODUCT]?
[READ RESPONSES ONLY IF NECESSARY]
10. Large home supply store (Specify name of store, e.g. Home Depot)
11. Discount department store (Specify name of store, e.g. Target)
12. Grocery or drug store (Specify name of store)
13. Nursery (Specify name of store)
14. Hardware store (Specify name of store)
15. By catalog or Internet (Specify name of seller)
16. Other (Please specify)
17. DK/NR
18. REFUSED

Q9D Where was it applied?
[CHECK ALL THAT APPLY]
1. Hard Surfaces, like the building perimeter, base of buildings, pet enclosures, driveways, sidewalks, patios or walls,
2. Lawns or turf,
3. Ornamental Landscaping, like flowers, shrubs or trees,
4. Food plants, like fruit trees, tomatoes, or garden vegetables
5. Other (Specify)
6. DK/NR
7. REFUSED
8. EXIT

Q10 Thinking of all the OUTDOOR pest control products you ever use, what is the total number of times you apply them per year?

6. Less than 1 time per year
7. 1-3 times per year
8. 4-6 times per year
9. 7-12 times per year
10. More than 12 times per year
7. DK/NR
9. REFUSED

[IF WHO=3 OR WHO >=5 SKIPTO HOWLIK]

Q11 For OUTDOOR pest control products that must be mixed with water before using, what do you do with the leftover solution?
[DO NOT READ—SELECT ALL THAT APPLY]

1. POUR DOWN THE DRAIN OR TOILET INSIDE YOUR HOUSE
2. POUR DOWN THE DRAIN OUTSIDE YOUR HOUSE
15. POUR IN THE STREET OR GUTTER
16. POUR ON THE LAWN OR IN ANOTHER GARDEN AREA
17. PUT IN THE TRASH
18. TAKE TO A HAZARDOUS WASTE DISPOSAL SITE
19. STORE AND USE LATER
20. APPLY TO OTHER AREAS (PLEASE SPECIFY):_____
21. REAPPLY TO SAME AREA UNTIL USED UP
22. OTHER (SPECIFY)
23. I ONLY MAKE ENOUGH TO USE, THERE IS NO LEFTOVER
24. DON'T USE ANY PRODUCTS THAT MUST BE MIXED WITH WATER
13. DK/NR
14. REFUSED
15. EXIT

Q12 How do you usually dispose of pest control products that you no longer use? [DO NOT READ—SELECT ALL THAT APPLY]

11. POUR DOWN DRAIN OR TOILET INSIDE YOUR HOUSE
12. POUR DOWN DRAIN OUTSIDE YOUR HOUSE
13. POUR IN THE GUTTER OR STREET
14. PUT IN TRASH
15. TAKE TO HAZARDOUS WASTE DISPOSAL SITE
16. GIVE AWAY
17. OTHER (PLEASE SPECIFY)
18. DK/NR
19. REFUSED
20. EXIT

Q13 What are the top two or three things that you consider, or that influence your decision, when you choose a pest control product to use?
[DO NOT READ--SELECT ALL THAT APPLY]

18. HEALTH/HUMAN SAFETY
19. PET SAFETY
20. ACTIVE INGREDIENT
21. COST
22. PACKAGING
23. HOW LONG IT WILL LAST
24. HOW FAST IT WORKS
25. RECOMMENDATION FROM SOMEONE ELSE
26. ENVIRONMENTAL CONCERNS
27. EASE OF APPLICATION
28. CLEARLY WRITTEN INSTRUCTIONS
29. PEST NAME OR PICTURE ON LABEL
30. ALREADY HAVE AT HOME
31. OTHER (PLEASE SPECIFY)
32. DK/NR
33. REFUSED
34. EXIT

Q15 Which of these do you read or look at on a pest control product label BEFORE buying it?
[RANDOMIZE ORDER OF PRESENTATION]
[READ EACH OPTION AND SELECT ALL THAT APPLY]

13. Picture of the pest
14. List of pests it controls
15. Safety information
16. Disposal information
17. How much to use
18. How to apply
19. When to treat
20. What the ingredients are
21. Other (Please specify)
22. DK/NR
23. REFUSED
24. EXIT

Q16 When you apply pest control products, how do you decide how much of the product to use?

5. Read and follow all directions on the container
6. Read directions on container and use them as guidelines
7. Don't read directions; use experience or best estimate
8. Other (Please specify)
7. DK/NR
9. REFUSED

Q17 Do you measure out the amount of pest control product or do you estimate the amount of pest control product to spray or apply?

3. MEASURE
4. ESTIMATE
7. DK/NR
9. REFUSED

Q18 What are the sources of information that influence your decision about what pest control products to buy?
[DO NOT READ -- SELECT ALL THAT APPLY]

19. NEWSPAPER ARTICLES
20. MAGAZINE ARTICLES
21. INTERNET ARTICLES
22. PRODUCT LABELS
23. POSTERS AT STORE WHERE PURCHASED
24. TEAR SHEETS AT STORE WHERE PURCHASED
25. EMPLOYEE AT STORE WHERE PURCHASED
26. OTHER METHOD AT STORE WHERE PURCHASED
27. WORD-OF MOUTH
28. ADVERTISEMENTS
29. CLASSES
30. GARDEN FAIRS/ SHOWS
31. UNIVERSITY OF CALIFORNIA FARM ADVISOR
32. UNIVERSITY OF CALIFORNIA MASTER GARDENER
33. OTHER (PLEASE SPECIFY:_____)
34. DK/NR
35. REFUSED
36. EXIT

Q21 About how many different pest control products are stored in your home?

SPECIFY NUMBER> [IF ANS=0, SKIPTO Q26]
0. NONE
98. DK/NR
99. REFUSED

Q22 About how old is the oldest pest control product you have?

5. Less than 1 year
6. Older than 1 year
7. Older than 3 years
8. Older than 5 years
7. DK/NR
9. REFUSED

Q26 Have you or any member of your household taken materials to a household hazardous waste disposal site near you?

3. YES
4. NO
7. DK/NR
9. REFUSED

[ALL SURVEY RESPONDENTS ARE PICKED UP HERE]

HOWLIK How likely is it that you would hire a pest control company or professional that offers to control pests using methods that pose less risk to the environment? Would you say that you are…?

5. Not at all likely, [SKIP TO WATRQAL1]
6. Somewhat unlikely, [SKIP TO WATRQAL1]
7. Somewhat likely, or [CONTINUE]
8. Very likely to hire a pest control professional that uses more environment-friendly methods?
8. DK/NR
9. REFUSED

TRANSNEW I'm going to read a list of factors that might influence your decision to hire a pest control company or professional that uses environmentally friendly methods. If each one were true, please indicate how likely you would be to hire such a company or professional.

PROFAC1 If such services cost more, would you be...?
PROFAC2 The treatment method was slower, would you be...?
PROFAC2 More follow-up visits were necessary, would you be...?

1. A great deal less likely to hire an environmentally friendly company or professional
2. Somewhat less likely, or
3. Would this factor not influence your decision?
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

WATRQAL1 To what extent do you think pesticides used around homes, yards, and gardens in your area <u>make it into</u> local creeks, rivers and bays?

5. Not at all
6. To a small extent
7. To some extent
8. To a large extent
7. DK/NR
9. REFUSED

WATRQAL2 To what extent do you think that the pesticides used around homes, yards and gardens affects the water quality in your local creeks, rivers and bays?

5. Not at all
6. To a small extent
7. To some extent
8. To a large extent
7. DK/NR
9. REFUSED

INFO Have you heard or seen anything in the media or on posters, brochures, or billboards about pesticide use and water quality in the last year or so?

3. YES [CONTINUE]
4. NO [SKIPTO Q27]
7. DK/NR [SKIPTO Q27]
9. REFUSED [SKIPTO Q27]

INFOSPEC Can you please describe what you heard or saw? Also, can you recall the source of this information?

2. SPECIFY
7. DK/NR
9. REFUSED

RESP Have you done anything differently in response to this information?

3. YES (Please specify)
4. NO
7. DK/NR
9. REFUSED

Q27 Now we'd like to ask some questions regarding your background-- first, what is your age?

AGE> [IF ANSWERED, SKIPTO Q29]
98. DON'T KNOW
99. REFUSED

Q28 In what year were you born?

19__
98. DON'T KNOW
99. REFUSED

Q29 Do you own or rent your home?

3. OWN
4. RENT
7. DK/NR
9. REFUSED

Q30 What is the primary language spoken in the home?

6. ENGLISH	[SKIP TO CITY]
7. SPANISH	[ALL OTHERS CONTINUE]
8. MANDARIN	
9. CANTONESE	
10. OTHER (PLEASE SPECIFY)	
8. DK/NR	[SKIP TO CITY]
10. REFUSED	[SKIP TO CITY]

Q31. What language do you speak?

1. Only [LANG FROM Q30]
2. [LANG FROM Q30] more than English
3. Both equally
4. English more than [LANG FROM Q30]
5. Only English
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

Q32. What language do you read?

1. Only [LANG FROM Q30]
2. [LANG FROM Q30] more than English
3. Both equally
4. English more than [LANG FROM Q30]
5. Only English
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

Q33. In what language are the movies, TV, and radio programs you want to watch or listen to?

1. Only [LANG FROM Q30]
2. [LANG FROM Q30] more than English
3. Both equally
4. English more than [LANG FROM Q30]
5. Only English
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

Q34. With whom do you socialize?

6. All [ADAPT FROM Q30]
7. More [ADAPT FROM Q30] than Non-[ADAPT FROM Q30]
8. Both equally
9. More Non-[ADAPT FROM Q30] than [ADAPT FROM Q30]
10. All Non-[ADAPT FROM Q30]
7. DON'T KNOW/ NO RESPONSE
9. REFUSED

CITY What city do you live in?

1. ALAMEDA
2. BERKELEY
3. CASTRO VALLEY
4. CONCORD
5. DALY CITY
6. DANVILLE
7. FREMONT
8. HAYWARD
9. LOS ALTOS
10. LOS GATOS
11. MOUNTAIN VIEW
12. NAPA
13. NOVATO
14. OAKLAND
15. PALO ALTO
16. PETALUMA
17. PLEASANTON
18. REDWOOD CITY
19. RICHMOND
20. SAN FRANCISCO
21. SAN JOSE
22. SAN LEANDRO
23. SAN MATEO
24. SAN RAFAEL
25. SANTA CLARA
26. SUISUN CITY
27. SUNNYVALE
28. VALLEJO
29. WALNUT CREEK
30. OTHER (SPECIFY)
98. DK/NR
99. REFUSED

CHILDREN Do you have any children under the age of 18 currently living in your residence?

1. YES
2. NO
7. DK/NR
9. REFUSED

Q35 How do you describe your race or ethnicity?

1. Asian (SPECIFY: _____)
2. Black or African American
3. Hispanic or Latino
4. Caucasian or White
5. Bi- or Multi-Racial
6 Other (SPECIFY: _____)
7. DON'T KNOW
9. REFUSED

Q36 What was the last grade in school that you completed?

1. Less than high school diploma/GED
2. High school diploma/GED
3. Some college, no degree
4. Associate degree
5. Bachelor's degree
6. A degree higher than a Bachelor's (i.e. Teaching Credential, Masters, Ph.D., JD)
7. DK/NR
9. REFUSED

Q37 Lastly, please stop me when I reach the category that includes your annual, household income before taxes…

14. Less than $20,000 per year

15. $20,000 - $29,999
16. $30,000 - $39,999
17. $40,000 - $49,999
18. $50,000 - $59,999
19. $60,000 - $69,999
20. $70,000 - $79,999
21. $80,000 - $89,999
22. $90,000 - $99,999
23. $100,000 - $124,999
24. $125,000 - $149,999
25. $150,000 - $174,999
26. More than $175,000
77. DON"T KNOW/ NO RESPONSE
99. REFUSED

CONCLUDE Thank you. That concludes our survey. Your participation is deeply appreciated.