

INTEGRATED PEST MANAGEMENT PILOT PROJECT BOSTON HOUSING AUTHORITY'S HOLGATE APARTMENTS

Background & Introduction

The Boston Housing Authority's (BHA) Holgate Apartments is an 85 unit building complex that primarily houses elderly and disabled persons of low-income. It is located in Roxbury; a neighborhood of Boston, MA.

The Problem

The Holgate Apartments had a documented and chronic pest problem. Building managers received significant resident complaints about pest sightings in their apartment units and common areas, including trash chutes, trash rooms, and areas surrounding the building. A majority of complaints involved cockroaches, but mice and rats were also cited as problems.

Historically, BHA has used a traditional approach to managing pest problems: they hired a pest control contractor to provide calendar-based applications of pesticides in apartments. In a calendar-based approach, the contractor typically applies pesticides every 3 months, or about 4 times per year, and returns to apply pesticides (known as "call-backs") according to resident complaints.

While calendar-based pesticide application has predictable costs and is easy to undertake, particularly for housing authorities working within limited budgets, there are inherent problems with this approach. Traditional approaches often have several shortcomings: 1) There is no tracking system in place to determine the effectiveness of the strategy; 2) Pesticides are applied to units without discretion - regardless of the presence of pests - and are generally *not* applied in common spaces; and 3) Contractor call-backs that are generated by resident complaints are costly and may not be included in the initial bid for contractors' services.

In the fall of 2003, BHA partnered with the Asthma Regional Council of New England (ARC) to implement a pilot project of Integrated Pest Management practices in its Holgate Apartment complex, using funding from a U.S. Housing and Urban Development Healthy Homes Demonstration grant. The pilot program was managed by BHA staff James McCarthy and Zenaida Figueroa. Those providing technical assistance included Kate Bennett, Director of Policy and Planning of BHA; Ellen Tohn of Tohn Environmental Strategies, LLC and ARC Senior Advisor; Laurie Stillman, ARC Executive Director; and Stacey Roberts, ARC Project Coordinator.

What is Integrated Pest Management?

Integrated Pest Management (IPM) is a multidisciplinary approach to pest management that requires new teams, new collaborations, data collection, tenant education, and a reallocation of resources.

IPM utilizes a variety of pest control methods rather than relying on just one approach (such as pesticide application). Conditions that introduce pests, sustain their existence, and promote infestations are addressed before chemicals are used. Targeting pests in a variety of ways greatly reduces the dependency on the use of chemical pesticides. Though chemical products and their application may play a role in an IPM program, they are not the focus of the overall plan. Unlike in a traditional approach, IPM places a considerable effort on pest exclusion, sanitary practices, and minor structural alterations when necessary. There are four fundamental IPM principles: 1) Monitoring pest populations both to gain a baseline understanding of infestation patterns and to provide ongoing observation; 2) Blocking pest access and entryways; 3) Eliminating food and water; and 4) Selectively applying low-toxicity pesticides to address documented problems. A successful IPM program or policy hinges on the collaborative efforts of *all those* involved in the management and maintenance of the building and places a particular emphasis on resident participation.

Integrated Pest Management at Holgate

Getting Started

The first steps in implementing the IPM program at Holgate involved identifying and recruiting the key players involved: appropriate individuals to act as the paid resident educator(s)/coordinator(s), a reliable pest contractor who understood the IPM goals and process, building maintenance and management personnel, and the residents themselves. The Holgate IPM project was based on a model developed by BHA and the Boston Healthy Public Housing Initiative (HPHI). The model supplemented a traditional IPM approach with the use of resident educators acting as IPM assistants. At Holgate, BHA used the materials developed by HPHI and undertook a more streamlined approach to using resident educators with the IPM contractor and building maintenance staff.

Resident Educators/Coordinators

The team at Holgate hired two Resident Coordinators to improve and enhance the delivery of IPM services while promoting healthier living and working environments among residents. The role of the Coordinator was to facilitate safe pest management efforts in residences, educate and empower residents regarding their role in safe pest management, and assist the IPM contractor in achieving more efficient and effective results. To recruit for the positions, the Holgate team placed flyers throughout the building and spoke to residents about the openings. Coordinators were paid \$10 per hour for their efforts.

Four individuals, chosen from the pool of resident applicants, underwent 12 hours of training over a period of three days. The training was administered by Don Rivard of *Rivard Resources*, an experienced IPM contractor. After the training session, the Holgate team chose two coordinators for the positions. All trainees were paid \$10 per hour for their participation. The coordinators learned the basic components of IPM protocols and procedures and the importance of their role as the contact for residents, pest contractors, and maintenance and management personnel. Coordinators learned how to:

- Demonstrate to residents the unit preparation and cleaning needed for improved pest control and personal health. This included unit preparation prior to pesticide applications
- Identify common pests (by knowing their biology, droppings, and behavior in order to mitigate pest infestations) and how to talk with the residents about the pests.
- Identify and remove pest evidence (by sweeping and vacuuming) in order to assess progress and teach residents the basics of "deep" cleaning.
- Set and collect pest monitors and traps, and record this data
- Record observations and draw basic floor plans to...

IPM Contractor

The task of hiring a licensed pest contractor to execute the required elements of the IPM program was a challenging process for the BHA project team. The team initially released a detailed 10-page RFP, but the response was inadequate. After shortening the RFP to 1 page and providing a more detailed scope of work as an attachment, they received more adequate and competitive responses. Ultimately, the RFP asked the contractor for the following activities and required the contractor to document these activities at all times:

- Perform an inspection and review monitoring samples from BHA in-house IPM Resident Coordinators
- Recommend a pest treatment plan and adhere to a treatment schedule
- List types and amounts of products needed to control pest activity
- Submit reports to the property owner/manager reflecting unit treatment activity, and maintenance and sanitation practices
- In addition to treating all units, treat all common areas, including hallways, offices, and kitchens, trash chutes, compactors, compactor rooms, storage areas, and boiler rooms.

Building Maintenance & Management Personnel

The building maintenance and management personnel at Holgate were vital to the success of the IPM program. They recruited residents to attend the IPM educator training and provided support to them during the project. BHA project team leader, James McCarthy, provided a 2 hour long training to building maintenance personnel. Personnel learned IPM basics, protocols and procedures, and their responsibilities to:

- Call in work orders as soon as possible;
- Make repairs to all areas of the building (both interior and exterior) identified as possible contributing factors to infestation; and
- Continue to monitor areas and make necessary building repairs as needed.

Resident Participation

To help ensure a high level of resident participation in their IPM program, BHA staff held a 2 hour long educational meeting where residents learned the purpose of the IPM project, how it would work, and their integral role in its success. They also had the opportunity to view an IPM educational video and participate in an open discussion of the project. The video was provided by Isles, Inc., a Community Development Corporation from Trenton, NJ. Ultimately, residents left the meeting knowing their responsibilities in the project, including to:

- Maintain housekeeping and minimize clutter in their units
- Communicate with the IPM Resident Coordinators, Pest Control Contractor, and building personnel
- Prepare their unit for IPM treatment and extermination
- Provide feedback to Coordinators and other IPM project team members about the project

IPM Implementation

The BHA project team followed the below schedule to implement the IPM program:

Schedule

Date	Activity	Description
Week of March 22	IPM Orientation meeting for Residents	Residents are informed of the upcoming IPM program that would be taking place in their homes.
March 29, 30, & 31	IPM training for BHA staff, Resident Coordinators	3½ day IPM training. 10 in attendance (6 BHA staff members and 4 potential Resident Coordinators).
April	2 IPM Resident Coordinators hired	
May	IPM Pest Contractor hired	
May 19	Resident Coordinators visit units	2 Resident Coordinators visit each unit (83 total units). One provides education to residents. The other places monitoring devices in pre-determined areas, inspects unit, and submits work orders where necessary.
	Resident Coordinators visit common areas	Resident Coordinators place monitoring devices in all common areas.
May 29	Resident Coordinators re- visit units	Resident Coordinators return to each unit to collect monitoring devices, record data, and replace devices with new ones. Coordinators continue to provide resident education, referring client to social services if further aid is required. If data collected from monitoring devices demonstrates any level of infestation, the unit is scheduled to receive extermination treatment.
	Resident Coordinators re- visit common areas	Resident Coordinators return to common areas to collect monitoring devices, record data, and replace devices with new ones. If data demonstrates any level of infestation, the area is scheduled to receive extermination treatment.
May 31	IPM Education Meeting for residents	Resident Coordinators, along with the BHA project team, update residents on status of

		program, answer questions and, where necessary, schedule extermination treatments with residents.
June 6 - August 30	Unit Treatments	<p>Resident Coordinators visit units scheduled to receive treatments to ensure units are properly prepared, assisting with preparation when needed, and check up on residents' well-being.</p> <p>The exterminator follows closely behind the Coordinators and treats units. Unit treatment includes picking up monitoring devices, recording the data, and replacing the device. 10 units are treated per day.</p> <p>Pest control contractor treats common areas.</p> <p>Resident Coordinators re-visit units <i>not</i> scheduled to receive IPM treatment, continuing to check up on monitoring devices in units and on residents' well-being.</p>
June 20 - September 6	Resident Coordinator Unit Treatment Follow-up	Two weeks after unit treatment, the Resident Coordinators re-visit all units to check-up on residents' well-being. In units receiving treatment, the Coordinators check up on the status of the project and whether the resident has noted any improvements. Coordinators also remind them of upcoming scheduled treatments.
September 6	Resident Coordinator Final Unit Visit	After the last unit treatment, the Coordinators visit the unit for the final time to check up on residents' well-being, collect final monitoring devices, and administer a resident questionnaire to elicit resident feedback about the project as a whole.
Each unit demonstrating any level of pest infestation receives a total of four treatments, taking place between 3-4 weeks apart, and the necessary unit follow-ups provided by the Resident Coordinator.		

Unit Assessment & Education

After completing the hiring process and holding the initial training and orientation meetings, the BHA project team began implementing the IPM program throughout the building.

Resident Coordinators began visiting individual units in May. For the first four visits, project leader James McCarthy accompanied the Resident Coordinators. Mr. McCarthy performed two unit visits while the Coordinators observed, then they switched roles and the Coordinators performed two unit visits while Mr. McCarthy observed. The Coordinators completed the subsequent visits to units on their own.

The first unit visits required two Coordinators and consisted of tenant education and home assessment. The Coordinators introduced themselves to the family and explained the purpose and activities of their visit. One Coordinator provided the resident education, including the following:

- Giving instruction to improve housekeeping, such as reducing clutter and moving appliances and furniture
- Discussing garbage storage and removal practices
- Demonstrating with the vacuum cleaner specific areas needing cleaning
- Distributing and reviewing the information package and cleaning materials, making sure to discuss health risks and problems associated with pesticides
- Asking to see and list pesticides currently used by the resident

During the resident education piece, the other Coordinator performed the unit assessment, which consisted of the following steps:

- Asking permission to walk through the apartment to become familiar with the layout and in order to observe potential problem areas
- Asking the resident to identify any areas they thought might be infested
- Slowly inspecting each room looking in/under/behind cabinets, furniture, and appliances, noting findings on the "IPM Unit Assessment Sheet"
- Identifying maintenance issues, such as holes in walls and plumbing leaks
- Placing 6 pest monitors (sticky traps) throughout the unit, including 2 in the kitchen (by the stove and the refrigerator), and 1 each in the bathroom, bedroom(s), and living rooms.
- Drawing a rough floor plan and note monitor placements.

Coordinators documented all findings, observations, and identified maintenance problems on the "IPM Unit Assessment Sheet." The Unit Assessment sheet tracked resident housekeeping practices, including level of cleanliness, clutter, and general housekeeping and sanitation practices. In 6 of the 83 units visited, the resident demonstrated signs of

needing additional help beyond what the Coordinators could provide. In these cases, Coordinators referred the resident to social services who provided weekly services of simple household aid such as cleaning the dishes, mopping the floor, cleaning the tub, preparing lunch or dinner, and vacuuming, among others. After completing the assessment and education pieces, the Coordinators prepared to leave by scheduling a subsequent visit, setting goals for the resident and assigning "homework," and answering any questions.

At this time the Coordinators also assessed all common areas inside the building, including trash chutes, trash compactors, compactor rooms, storage areas, and boiler rooms. They observed and recorded pest activity or evidence of pest activity, identified maintenance issues, and placed monitoring devices in each of the areas inspected.

The building maintenance staff was responsible for inspecting the exterior of the building, observing and recording pest activity or evidence of pest activity, possible pest entry routes, and identifying and resolving maintenance issues. These areas included exterior walls and grounds.

Ten days following the initial unit visit, the Coordinators returned to each unit and common area to collect the monitoring devices and replace the devices with new ones. When re-visiting units the Coordinators also continued to provide education to residents, being sure to give pointers, suggestions, and answer any questions. The used devices were placed in individual baggies labeled by unit number or common area. All data was recorded on the "Holgate Tracking Form." Collecting and recording the data on pest activity established a baseline of pest infestation and provided valuable information that helped tailor the pest exclusion and application strategies. If any unit/area showed a trace of infestation, that unit was scheduled to undergo IPM extermination treatment.

At the end of May, at the completion of the assessment piece of the project, the Coordinators and the BHA project team held another resident meeting to continue the IPM education process. Coordinators and BHA staff updated residents on the status of the program, answered questions and scheduled extermination treatments with residents, where necessary. The team also reminded residents how to prepare their unit for the pest control contractor.

Unit Interventions/Extermination Treatment

The unit interventions were scheduled to take place at the beginning of June. The first round of interventions consisted of a "pre-visit" from the Resident Coordinators, IPM treatment administered by the pest control contractor, and a follow-up visit by Resident Coordinators.

The Coordinators visited those units with documented pest problems about 20 - 30 minutes ahead of the pest control contractor to start preparations with the resident. When the pest control contractor arrived, the Coordinator and the contractor performed

the treatment together, taking care to sanitize the unit by removing or killing as many pests as possible using backpack style vacuum cleaners.

The Coordinator and contractor specifically performed the following tasks:

- Vacuumed up dead roaches, egg capsules, and body parts, and killed and/or disposed mice or rats
- Scraped old, dried gels
- Filled and sealed holes, cracks and crevices with caulk, expanding foam, and/or copper gauze
- Applied Max Force select gels (active ingredient: Hydramethylon) and Max Force bait stations (active ingredient: Fipronil), and other low-toxicity chemicals
- Collected monitoring devices and replaced with new ones

After completing the above activities, the Coordinator scheduled the next treatment visit with the resident, set goals and assigned "homework" to the resident, as well as answered any questions.

The coordinators and contractors were able to treat 10 units per day and completed the first round of treatments in 2 weeks. After completing the first round in all applicable units, the Resident Coordinators performed a "follow-up" visit. Coordinators asked how the program was going for residents, whether they observed improvement, and how they liked the first round of treatment. Units with documented pest problems received 3 rounds of chemical treatments over a period of 3 months.

If a unit was not scheduled to undergo extermination, the Coordinators still visited that unit to collect, record, and replace the data monitoring devices. In this way, the unit continued to be monitored for pests, and the Coordinator continued to perform well-being checks on the resident. These units, however, did not receive IPM extermination treatment, and also did not receive "follow-up" checks from the Coordinators

Treatments in the common areas and trash chutes were similar. Each of these areas received 3 rounds of treatment over a period of 3 months. The pest control contractor initially focused on sanitation by removing or killing pests using vacuum cleaners, in particular:

- Vacuumed up dead roaches, egg capsules, and body parts and disposed of dead mice or rats
- Filled and sealed holes, cracks and crevices with caulk, expanding foam, and/or copper gauze
- Applied Max Force select gels (active ingredient: Hydramethylon) and Max Force bait stations (active ingredient: Fipronil), and other low-toxicity chemicals
- Collected monitoring devices and replaced them with new ones

Final Steps

After the last unit treatment, the Coordinators visited the units for the final time. They performed the last post-treatment follow-ups, collected the final dated monitoring devices and recorded the results. Coordinators also distributed an informal survey to residents that asked questions about their satisfaction with the program. One week later, BHA staff collected the evaluation forms from the residents.

IPM Program Costs versus Traditional Pest Control Costs

In evaluating the costs of the Traditional versus IPM pest control programs at Holgate, it is important to consider both the absolute costs and the concept of cost-effectiveness. We compared the costs involved in the first and third years of implementing the IPM program with the cost of their traditional pesticide control program. In so doing, we examined the costs of using both types of contractors, training and stipends involved with implementing the IPM program, miscellaneous expenses, and the costs of the building maintenance staff devoted to controlling the pests. Although the initial costs of IPM in Year 1 were more than four times higher than the traditional pest program, by the third year, *the costs were virtually the same, with much better pest control using IPM.* For this reason, IPM would be considered to be cost-effective.

The below costs include contract, direct labor, expenses, and importantly an estimate of BHA staff time to attempt to capture the reduction in staff time dealing with pest complaints once pest levels are under control. Such savings in staff time enable personnel to address other pressing building maintenance issues and/or resident social service needs.

	IPM YR 1	TRADITIONAL	IPM YR 3**
Contractor	\$10,720	\$3,459	\$6,428
IPM Coordinators	\$2,930		
Contacto call-backs		\$240	
Training Stipends	\$125		
Door Sweeps + Installation for all units	\$809		
Subtotal Contract/ Direct Labor/Supplies	\$14,584	\$3,699	\$6,428
IPM training *	\$2,000		
Subtotal Start Up Costs	\$2,000	\$0	\$0
TOTAL COSTS EXCLUDING BHA LABOR	\$16,584	\$3,699	\$6,428
Building Manager Hours/Year	12	52	
Building Manager Costs/Year (\$24/hr)	\$288	\$1,248	
BHA Custodian Hours/Year	52	104	12
BHA Custodian Costs/Year (\$18/hr)	\$936	\$1,872	\$216
TOTAL COSTS WITH BHA LABOR	\$17,808	\$6,819	\$6,644

* Future IPM work would not require this level of outside expert training. The BHA anticipates being able to deliver such training in-house.

** Year 3 IPM contractor costs cover treatment of the common areas every other month, and quarterly monitoring of pest levels and treatment as needed.

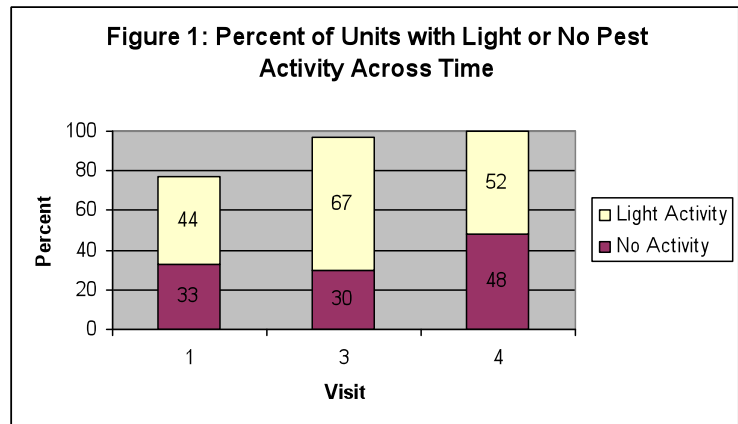
Results

Analysis of the Holgate records indicates how conditions changed over time and the effect that residents and others involved in the program experienced. Below is a discussion of the results.

Quantitative Results

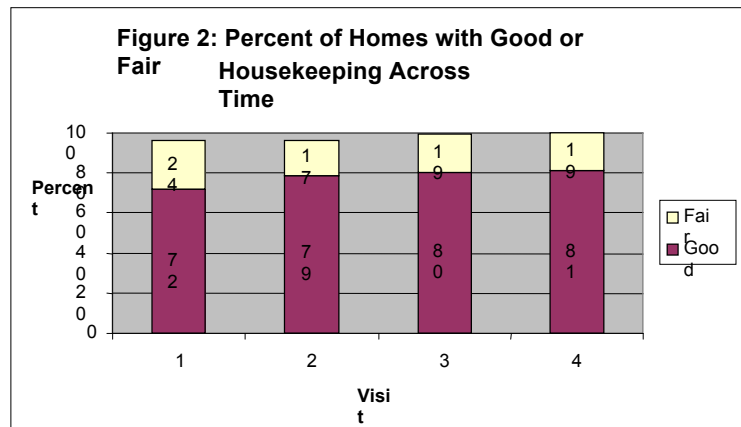
At the first visit, 33% of units showed no pest activity. When unit treatment ended, 48% of units showed no pest activity, **representing a statistically significant 15% increase of units demonstrating no pest activity.** Furthermore, at the time of the last unit treatment **100% showed either no or light pest activity.** This consistent progression indicates that pest activity continued to improve with each unit treatment.

Pest activity in resident units decreased over time.



Resident housekeeping improved a little from the first visit to subsequent visits.

The biggest improvement in housekeeping took place after the first educational visit. The percent of units with good housekeeping went from 72% at the first visit to 81% at the last visit. However, housekeeping improved from 72% to 79% from visit 1 to visit 2 and only increased 2% over the next two visits. Because housekeeping improved so slightly over visits 2 - 4, this could indicate that of all unit visits, **the first visit had the biggest impact in changing resident behavior.**



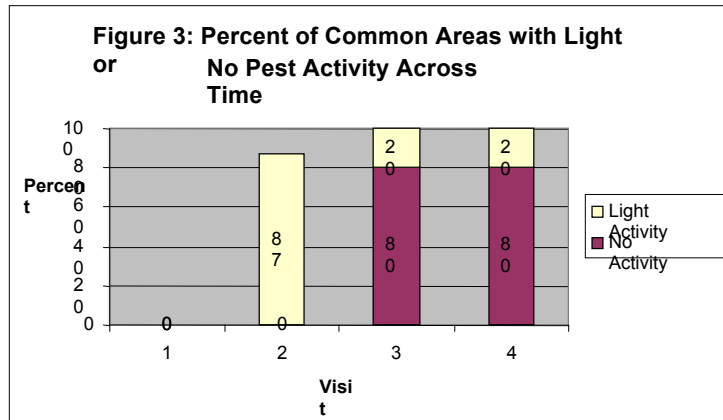
Resident preparation increased a little from the first visit to the last.*

For units with pest activity, resident preparation increased from 71% at the first visit to 79% at the third visit. At visit 4, resident preparation decreased to 77%. Though this change is statistically significant, in practical terms it is not large. The pattern of improvement mirrors the pattern of improvement in resident housekeeping, indicating that

the first educational visit had an effect on the level of unit preparation, but subsequent educational visits did not.

*Unit preparation includes: emptying and wiping down all kitchen cabinets, emptying and wiping down dresser draws (if needed), and cleaning out the closets so that the exterminator has access to it.

Pest activity in common areas decreased over time.



All common areas started out with high pest activity but by the 3rd and 4th visits there was only a little (20%) light activity remaining. **This represents a significant change in pest activity.**

Qualitative Results

Tenants were very satisfied with the program.

Based on an informal survey given at the conclusion of the project, the majority of Holgate residents were very satisfied with the implementation and results of the program. They were pleased with the IPM assistants' dedication to the job and felt the program delivered on its promise to rid their homes of pests. While some residents felt that even more could have been done to address the pest problems, most of those responding to the survey simply asked one thing from the management team at Holgate: maintain the IPM program in their building. One resident even requested funding from the mayor so that the team could run a cable program to educate the elderly on how to roach-proof their apartments.

The IPM program increased the quality of life for some residents beyond simply improving the pest problem in their homes. In 6 of the 83 units visited, IPM educator visits prompted increased social services for residents. In these units, residents demonstrated signs of needing additional help beyond what the Coordinators could provide. Under these circumstances, Coordinators referred residents to social services who provided weekly assistance in the form of simple household aid such as cleaning the dishes, mopping the floor, cleaning the tub, preparing lunch or dinner, and vacuuming, among others.

The maintenance manager gave the program high marks.

The apartment's maintenance manager expressed overwhelming satisfaction for the program. When asked whether he saw improvement in levels of pest infestation, he stated that the problem was "100% better." As discussed in the cost comparison section, he also

estimated that before implementing the program, he devoted approximately 15 hours per week dealing with resident complaints about pest sightings, infestations, and other problems. At the conclusion of the program, he estimated that he now spends 1 hour each week dealing with resident complaints. He is delighted to spend his time managing general building maintenance issues rather than responding to individual resident complaints about pests.

Educational DVDs developed as a result of the program.

Based on knowledge gained from the program, the Asthma Regional Council developed two IPM Educational DVDs. One video, "Integrated Pest Management: A Real Solution to Pest Problems," addresses property managers, property owners, and maintenance staff. It features BHA housing manager Jim McCarthy explaining how he has successfully used IPM practices to address pest problems in the buildings he manages. The other video, "Stop Pests in Your Homes," targets tenants and residents and offers advice on how to avoid pest problems. This video is currently being translated into Spanish with copies available for distribution in August.

Conclusions

The IPM program at BHA's Holgate apartments was significantly more effective than traditional pest management practices used there in the past. At the conclusion of the project, **100% of the units demonstrated little or no pest activity**, up from 73% at the project's initial stage. The key point of departure from traditional strategies took place in one aspect of the IPM program: monitoring of pest activity and focusing pest control efforts in common areas with the greatest levels of infestation.

Monitoring units and building common areas showed that pest activity was significantly high in the trash compactor rooms and the boiler room. During the course of the pilot program, these areas received pest treatment for the first time in the building's 40-plus year history. The result? **A 67% reduction in pest activity in the common areas**. Even more striking is that **areas showing no pest activity increased from 0% to 80%**. Monitoring also allowed the project team to target not only specific units with pest problems (versus treating all units regardless of pest activity) but also specific areas in the units. Knowing where the pests were living or coming from allowed the project team to focus on those areas, resulting in more effectively reducing pest activity.

Ultimately, the IPM program at Holgate was deemed hugely successful:

- Pest infestations decreased and were documented;
- The majority of residents *and* the maintenance manager expressed satisfaction with the results;
- The program is sustainable now that the initial pest problem is under control; and
- The BHA believes the program is cost effective. Although initial program costs were substantially higher than the traditional pest control costs, year 3 IPM contractor costs are manageable.

Based on the success of this project, BHA hopes to expand IPM practices to more of its public housing developments. The team hopes that the IPM program at Holgate and previous efforts at the Charlestown development will serve as models to other housing authorities on best pest management practices.