

WHAT'S INSIDE THE BUILDING  
ENVELOPE?  
BUGS



A Practical Approach to Managing Pest  
Control Data

Rachael Perkins Arenstein, Aaron Crayne, Neil Duncan,  
Lisa Kronthal, Athena LaTocha, Scott Merritt,  
Chris Norris & George Ramos



A joint presentation from staff at the American Museum of Natural History  
and the National Museum of the American Indian.

## OBJECTIVES

- Record the results of pest trapping
- Associate results with building features
  - Doors
  - Windows
  - Gaps or cracks in walls, floors
- Map results onto building floor plans
- Relate to environmental preferences of pest species



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*AMNH Pest Manager* arose out of a desire to be able to store, analyze, and visualize the results of the pest trapping program carried out by a number of the science departments at AMNH. The eventual outcome, we hoped, would be that we could look at a floor-plan of the Museum and see where pest problems were occurring.



## FIRST IDEA: Aperture

- Computer Assisted Design (CAD) & Information Management program
- PROS
  - Used by AMNH construction
  - Has floor plans for whole Museum
  - Powerful underlying database to store results

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It was suggested that we might use Aperture, a CAD software package used by the Museum's Division of Construction and Facilities, to store pest trapping data.

## FIRST IDEA: Aperture

- CONS

- Very expensive
- Requires trained operator
- Not very visual



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However, while Aperture has the capacity to store this data, it is prohibitively expensive, not particularly visual, and requires a trained operator.

## SECOND IDEA: Use 'off-the-shelf' database software

- Cheaper
- Easier to use
- Likely to be more widely used

On reflection, we felt that a dedicated system that used a cheaper software package, and was capable of being queried directly by collections staff, would be more desirable.

## FINAL CHOICE MICROSOFT ACCESS

- Widely available in AMNH
- Widely available to other institutions
- Experienced in its use
- Reasonably priced



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## WHAT INFORMATION IS COLLECTED?

- What was caught?
  - Species, life stage, pest or predator
- When was it caught?
- Trap surroundings?
  - Near walls, doors, windows, specimens, inside cabinets, etc.
- What does it tell us?
  - Environmental preferences



## HOW DO WE QUERY?

- Date of capture
- Species
- Environmental preferences
- Room
- Trap
- Room features



## HOW DID WE WANT TO DISPLAY RESULTS?

- Visually on a floor plan

- Grid
- Traps
- Colors



- Visually using charts

- Proportional (e.g. pie chart)
- Quantified (e.g. bar chart, column chart)



- Raw data in tables



## SOLUTION!

### Pest Manager Database

- Access Database
- Data queried via form
- Query results displayed as...
  - Embedded bitmap floor plan
  - Column chart (generated using MS Excel)
  - Data table



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The result was *AMNH Pest Manager*.

*Pest Manager* uses commonly available Microsoft software packages. The database itself was built using MS Access; graphs of results are generated using MS Excel; and the results are plotted onto bitmap images of floor plans, which can be amended using MS Paint, a standard Windows accessory. These elements are linked together by routines written in Visual Basic.

*Pest Manager* stores three types of information.

# TRAP INFORMATION

The screenshot shows a software window titled "frmTraps" with a blue header. The main content area is black with white text and form fields. At the top right, it says "Trap Information" in red, with a sub-note "(Apply a filter to navigate to a specific record)". The form includes several input fields: "Section-Floor-Room" (a dropdown menu), "Trap No" (a text box), "Cabinet Type" (a dropdown menu), "Pesticide" (a dropdown menu), "Height Off Ground" (a text box with "0" entered), "Proximity to Public Area" (a dropdown menu), and "Proximity to Restaurant" (a dropdown menu). Below these are several checkboxes: "In Cabinet?", "External Wall?", "Near Window?", "Near Door?", "Near Cracks?", "Near Ducts or Pipes?", "Near Water?", "Near Open Shelving?", "Near Mounted Specimen?", and "Near Specimen Cabinet?". A "Close Form" button is located on the right side. At the bottom, there is a "Trap Comments" text area.

1. **Trap Site information.** This includes information about the surroundings of the trap (within a 3 meter radius) which may have implications for pest management, including the presence of doors; windows; cracks or holes in the walls or floor; specimens; the type of pesticide treatment used; and the proximity of public spaces and restaurants.

# PEST EVENTS

The screenshot shows a software window titled 'frmPestEvents' with a dark blue background. At the top right, there is a white box with the text 'Pest Events'. The form contains the following fields and elements:

- Trap: 17-1L-ML7, 19
- Placed On: 10/26/2001
- Retrieved On: 11/26/2001
- Common Name: American Cockroach
- Pest Taxonomy: A table with columns GenusName, FamilyName, OrderName, EcoType, and Association. A 'Modify Taxonomy' button is to the right.
- Quantity: [empty text box]
- Dust Cover: 0-24%
- Species: [empty text box]
- Lifestage: Adult
- Comments: [empty text box]
- Close Form button
- Record: 1803 of 1803

GenusName	FamilyName	OrderName	EcoType	Association
▶ Periplaneta	Blattidae	Orthoptera	Pest	(none)

2. **Pest Event information.** In *Pest Manager*, a “pest event” is defined as the occurrence of a given growth stage of a species, in a particular trap, at a particular time. Other information stored includes the number of individuals, the growth stage, and the dates when the trap was placed and retrieved.

# QUERYING THE DATA

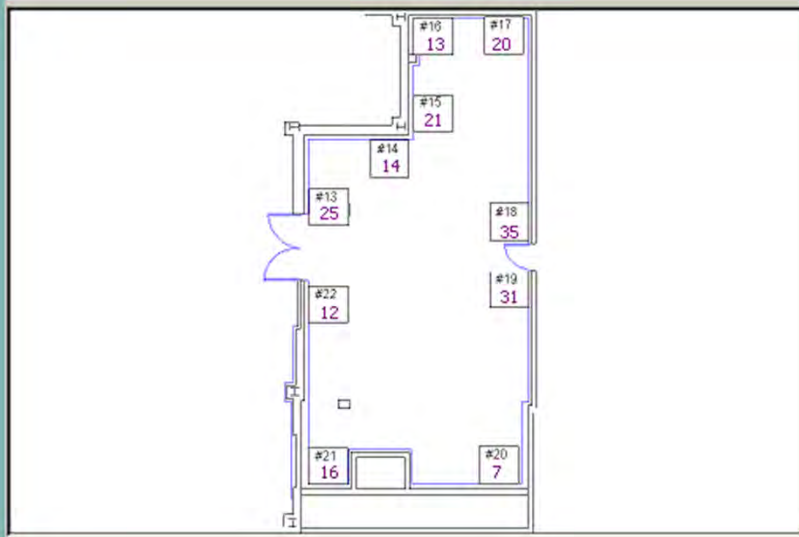
The screenshot displays a software interface titled "View Results" with a subtitle "Enter keywords, or select from the list:". It features several search filters: "Location:" with a dropdown menu showing "7-1L-ML7", "Common Name:", "EcoType:", and "Pest Association:", each with a dropdown menu. A "Run" button is positioned to the right of these filters. Below the filters is a "Time Period:" section with radio buttons for "All" and "From:" followed by a date input field. A "Close Form" button is located to the right of the "Time Period:" section. The main area of the interface shows a floor plan with several rooms, each containing a small box representing a trap, labeled with numbers #10 through #22. The floor plan is rendered in a light blue and white color scheme.

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There are two main ways to query this data. It is comparatively easy to set up simple or complex queries using the Access Query Wizard; this is the preferred method for searching on, for example, room features, or for searching on more than one room at a time. However, the main way to query the database is via the *Pest Manager* Query Screen. This is room-specific, and combines a number of basic search terms (species names, trap dates, ecotype, or association) on one screen.

Selecting a room under "Location" opens a blank floor plan for the room concerned. The position of each trap is shown by a box with the trap number in it.

## DISPLAYING RESULTS: Floor Plans

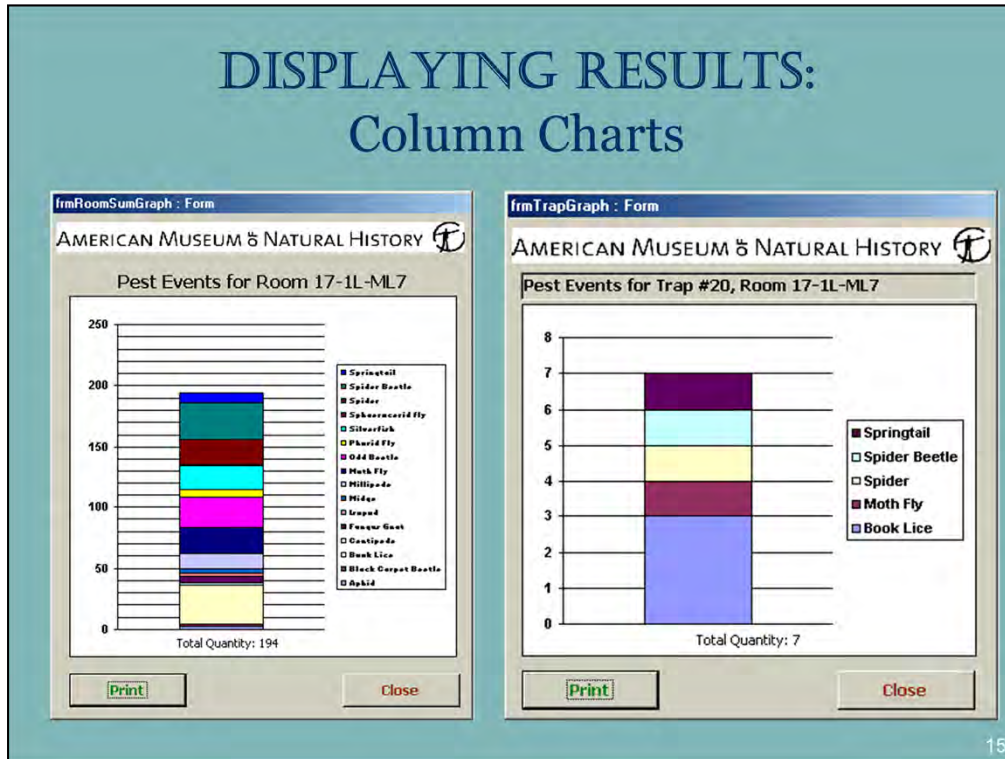


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A query can then be run either for all results from that room (by hitting “Run” with all other fields left blank) or for subsets of the data selected using the search fields. Results are displayed in three ways:

Total captures for each trap appear on the floor plan as a number in the relevant trap box. Clicking on the box opens a second chart, showing this total broken down by species.

# DISPLAYING RESULTS: Column Charts




A column chart is generated, showing total captures for each room, broken down by species.

## DISPLAYING RESULTS: Data Table



frmRoomSum

 Pest Events For Room  
*17-1L-ML7*

	Trap#	Placed	Retrieved	CommonName	Quantity
<input checked="" type="checkbox"/>	13	3/21/2001	4/24/2001	Odd Beetle	3
<input type="checkbox"/>	13	5/24/2001	6/21/2001	Odd Beetle	4
<input type="checkbox"/>	13	5/24/2001	6/21/2001	Spider Beetle	1
<input type="checkbox"/>	13	6/22/2001	7/23/2001	Odd Beetle	2
<input type="checkbox"/>	13	9/21/2001	10/26/2001	Odd Beetle	1
<input type="checkbox"/>	14	3/21/2001	4/24/2001	Odd Beetle	1
<input type="checkbox"/>	14	3/21/2001	4/24/2001	Spider Beetle	1
<input type="checkbox"/>	14	4/24/2001	5/24/2001	Odd Beetle	1

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There is also an option to view the raw data for the room as a table.

## PILOT STUDY

- Department of Mammalogy Building 17
- Self-contained facility
- 5 collection rooms
- Prep lab & dermestid colony
- Problematic HVAC system
- 109 traps
- 20 months of data



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From June 2000 to March 2002, we conducted a trapping survey in the Mammalogy collection areas of Building 17 as a pilot project for the development of *Pest Manager*. Our study utilized 246 Victor sticky traps in 9 rooms; over the 21 month period we recorded 1803 pest events, totaling 2895 captures, and involving 44 different species.

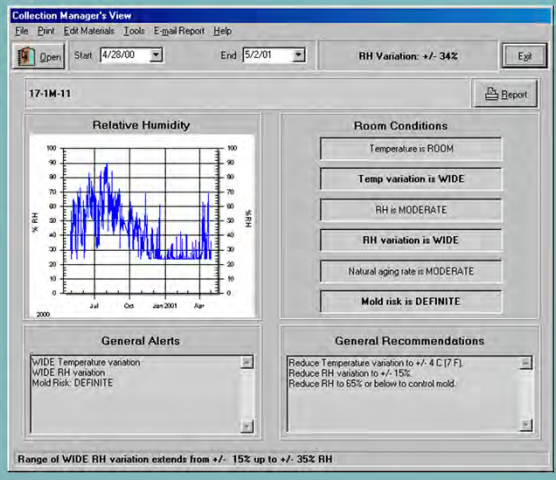
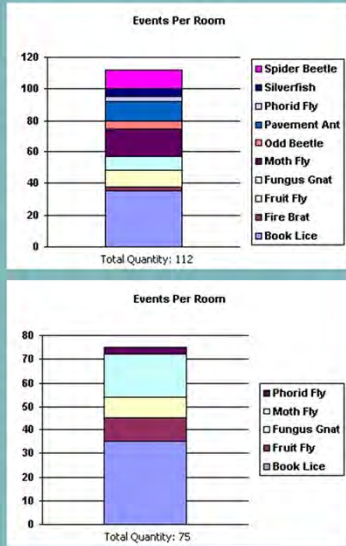
The results of the study are currently being analyzed, with the eventual aim of publication. Our remarks here will concentrate on the practicalities of operating the database.

## EXPERIENCES SO FAR

- Time intensive to collect data
  - Trap placement & pick-up
  - Identification of captured insects
  - Inputting data into database
- Database has helped to pin-point localized problems



# MOLD PROBLEMS IN Building 17



## SETTING UP TRAPS



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### Setting Up Traps

There was some discussion about the placement of traps. We eventually decided to place the traps in areas where we felt pests were more likely to be found (around doors, openings in the walls, and along the margins of the room), rather than confine placement to a sampling grid. Traps were initially sampled at 3 monthly intervals, until it became apparent that, with time, clogging of the traps with dust was reducing the effectiveness of sampling. We subsequently moved to a monthly sampling regime.

## PLACING TRAPS



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Each time a new trap site was set up, details of the features within a 3m radius of the trap were recorded on a form. For speed, the form was set up as a series of yes/no questions, mimicking the layout of the Trap Site data entry screen in *Pest Manager*.

## PICKING UP TRAPS



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### Collecting the Data

Traps were retrieved and stored in a cabinet until ready for identification. Identification was carried out using a variety of publications on pest species (Hedges, 1998a & b; Hedges & Lacey, 1996; Kingsolver, 1988; Mallis, 1997); in problematic cases, advice was sought from colleagues in the AMNH Division of Invertebrates. As might have been predicted, the initial time investment required to become familiar with the species was high, but the time required for identification declined with experience. Results were recorded on simple report forms – one form for each event.

## GIANT MOSQUITO



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### Entering Data

Data entry for both trap sites and pest events was done from the forms. This proved to be an onerous task, with a very high error rate (in some cases, up to 30% of pest events). Errors were identified by proofing *Pest Manager's* data tables against the forms.

### Querying the Data

We encountered two main problems with querying early versions of *Pest Manager*. The first was the speed at which the program ran – the graphics-heavy nature of the system proved challenging to all but the fastest machines. The second, and more serious problem was ballooning file size; running two or three queries would rapidly increase the size of the database from around 2MB to over 60MB; the database needed to be compacted at the end of each session to deal with this project. Adjustments to the code increased the speed of query processing, but the major breakthrough in both areas came when *Pest Manager* was split into two separate Access databases – a “front-end” application, used for data input and queries, and a linked file holding data. Using the split database, file size remained constant at around 1.5 – 2MB.

# TRANSITION





Research Branch  
(RB) Bronx, NY

Cultural  
Resources  
Center (CRC)  
Suitland, MD



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As mentioned earlier in the week, the National Museum of the American Indian has been involved for the past four years in the move of its collection from the Bronx facility in New York to the new Cultural Resources Center in Maryland. Even though we will ultimately be vacating the building, as long as objects are stored at our Bronx facility we have had to continue basic collections management practices such as pest monitoring.

## OUTLINE



- History of Research Branch facility
- Collaboration with AMNH
- Database modifications
- Bar coding & scanning
- Image database
- Future developments

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The Bronx facility has had a long history of pest infestations and so before I continue I'd like to explain a bit about our facility and collection so that you understand why we felt that the investment of time and resources was worthwhile. I'll then discuss our collaboration with AMNH, the adjustments we made to the database, the development of a bar-coding system and images database, and finally what we hope may be future developments for this project.

## RB FACILITY



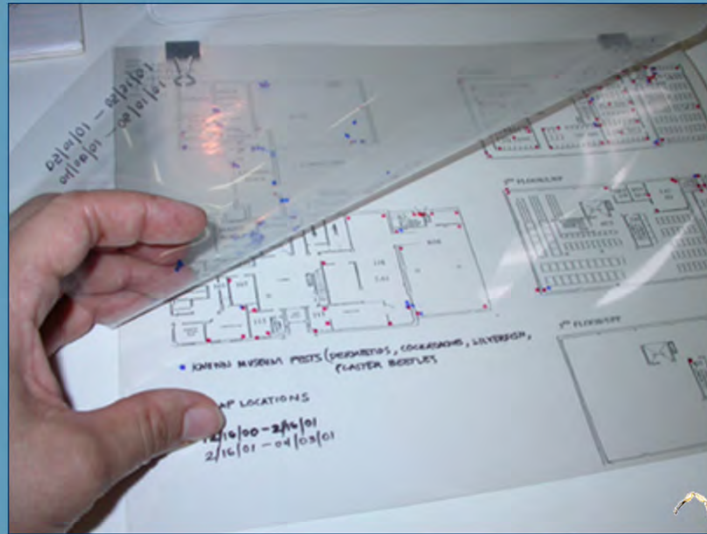
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As a museum devoted to the culture of native people of the Western hemisphere, much of our collection is ethnographic and organic materials, and therefore vulnerable to infestation. It is also housed in the oldest part of facility, which dates from 1920, and is in an advanced state of decay. To respect the wishes of our native constituents, as well as protect the health of our staff, the museum has made a concerted effort to eliminate the use of chemical pesticides on the collection, moving instead towards a well-developed integrated pest management program. While we have made great strides in control, we were unsatisfied with the management of the vast amount of data generated, until recently.





## SYSTEM II: Transparencies



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We had difficulty visualizing the results, so we began plotting museum pests monthly on transparencies that, when layered over time, indicated areas requiring greater inspection or action to be taken, if necessary.





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This was a fairly workable system, but as the move winds down, it is widely recognized that much of the institutional memory relating to the Research Branch and its history of storing the museum's collection will be lost as staff move on to other jobs. We hoped that by investigating new technology we could put our pest monitoring data in a format and system to be implemented in all NMAI facilities that would be clear and usable in the future and would 'live' beyond the move project and the closing of the RB.

# COLLABORATION ON PEST MANAGER DATABASE



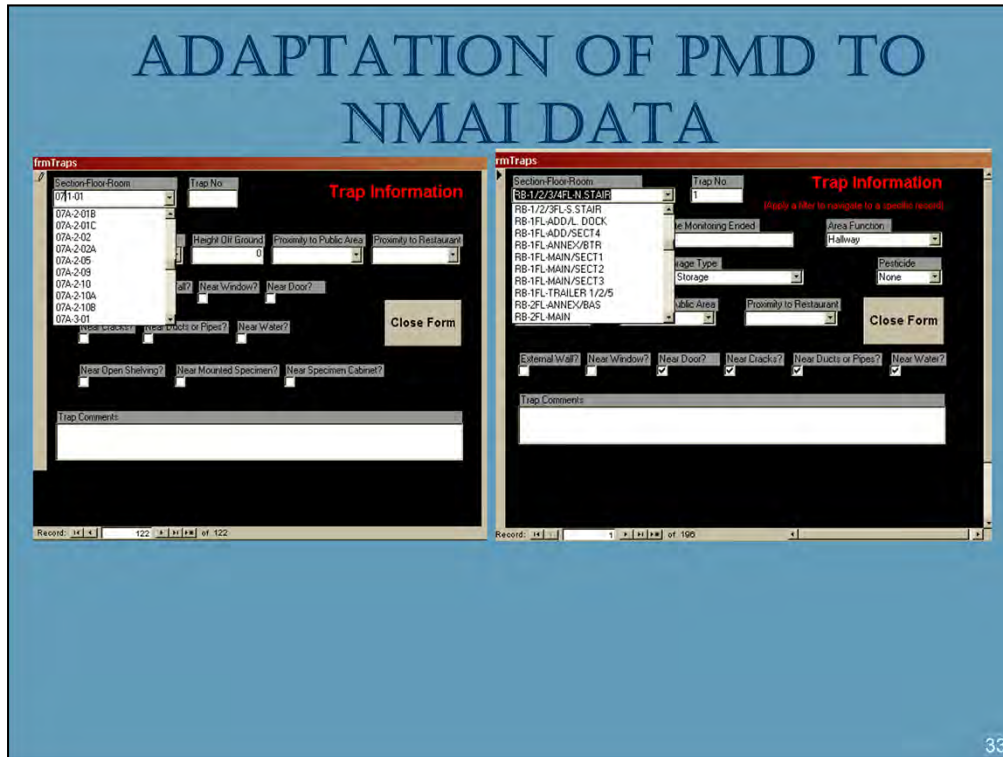
NMAI committed  
to:

- Troubleshooting & adapting program
- Developing barcoding data entry system
- Creating image database

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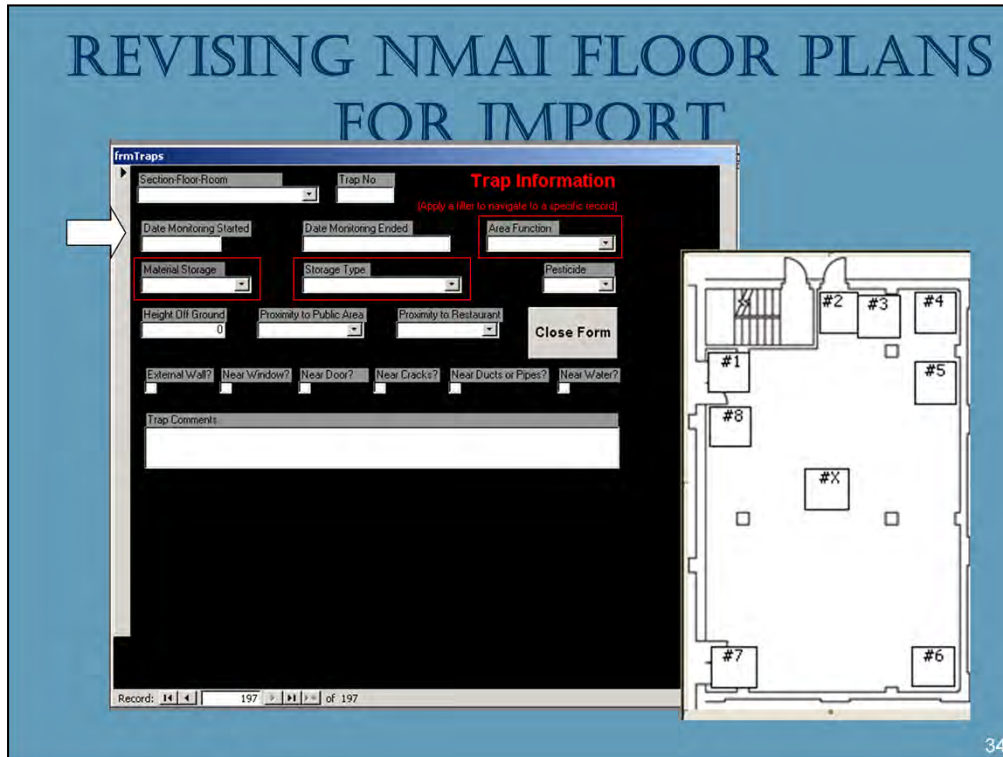
During the fall of 2000 NMAI staff heard that AMNH had developed a visual mapping program, and we wondered whether this might answer our problems in visualizing our data. In 2001 we contacted the AMNH team that had developed the *Pest Manager Database* (or *PMD*), to inquire about their program and see if this could move us beyond the capabilities of our spreadsheets and transparencies. AMNH offered us a copy of the database to test drive in exchange for collaborative assistance from NMAI. Since then, we have been working on three elements: troubleshooting and adapting the *PMD* program for use by a wider audience, developing a system for bar coding and scanning to facilitate fast and accurate data entry for traps and pest events, and developing an image database.

# ADAPTATION OF PMD TO NMAI DATA



Getting set up with the AMNH *PMD* program required a considerable time investment. We first removed the AMNH building locations and trap information from the Access tables and, using a format based on their coding, devised an identification system for our buildings. Our floor plans were already in Aperture, but they needed to be broken up into smaller sections that would fit within the *PMD* program window while remaining big enough to draw in the traps.

# REVISING NMAI FLOOR PLANS FOR IMPORT



We also changed the layout, quantity and type of fields on certain screens making their application more appropriate to the different material types and storage locations. We tried to do this in a way to not only make it more applicable for future use at the various NMAI facilities but for others at AMNH as well. The Trap Information screen was the most heavily modified. During the Move Project we have been clearing collections from various rooms and as a result, removed traps that no longer function in these areas. We wanted to track the date that monitoring started and ended on the Trap Information screen, so we added two date fields at the top of the screen for this. Since not all of our collections are stored in cabinets and our monitoring is not limited to object collections, we discarded AMNH's singular Cabinet field, replacing it with three separate fields: Area Function, Material Storage, and Storage Type. We then changed the check boxes along the lower half of the screen.



## TIME TRIALS

- Recorded times for bi-monthly monitoring
- Retrieving traps
  - Making & Placing new traps
  - Identifying captures
  - Inputting data
- 19.5 hours average with Excel spreadsheet
- 16 hours average with PMD



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In all it took months of sporadic effort for NMAI to set up a working version of the *PMD*. The learning curve was steep but some initial time trials showed that it made a difference. Using the spreadsheet I was averaging about 19.5 hours to make, place and retrieve our 196 traps throughout the building, which included identifying and recording the captures. In the first month of using the *PMD*, this time dropped by three and a half hours to a total of 16 hours. The next step was to see if improving the speed of the data entry using barcodes would further reduce this time.

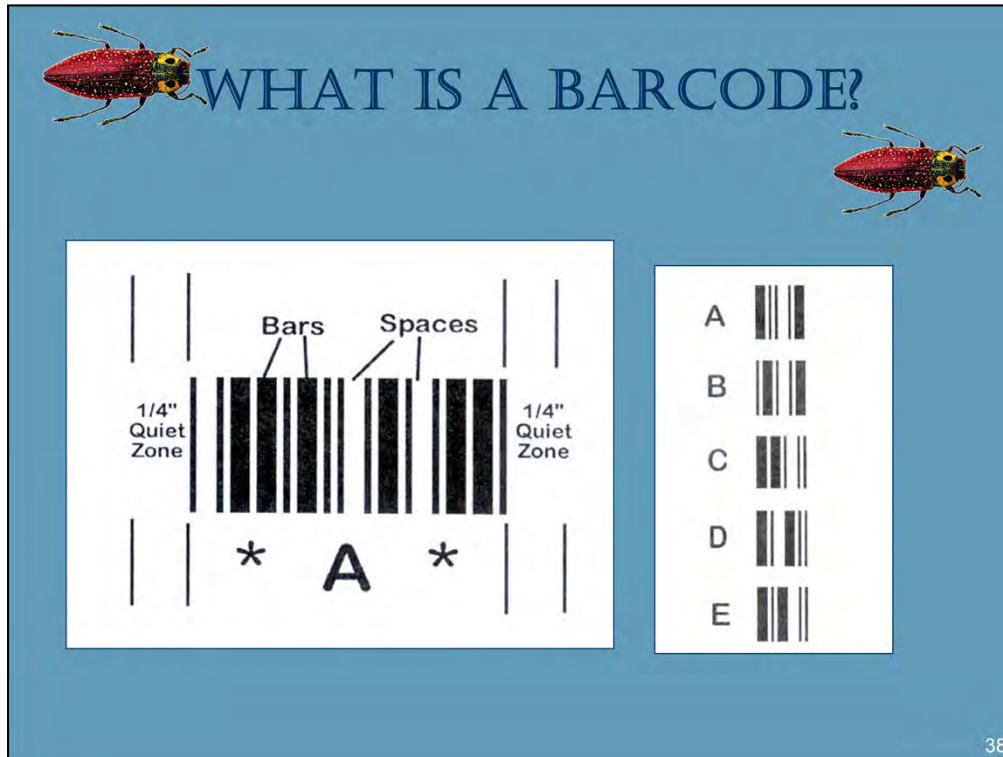
## BARCODES & SCANNING



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As mentioned earlier in the week, NMAI began working with barcodes and scanners to track objects for the collection move. By the time our collaboration with AMNH began, we had gone through several generations of technology and thought that it would be easy to adapt our existing knowledge and processes for use with the Pest Manager Database in order to streamline data entry and reduce user error.

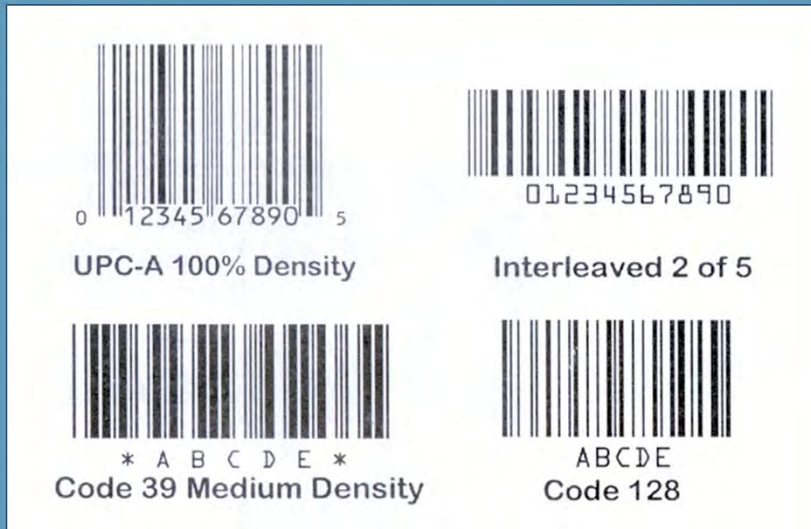
I'd like to give a bit of background information on barcodes and readers for those who may not be as familiar with them. Bar coding technology can be implemented with a broad range of sophistication but the basic elements of any system are relatively straightforward.



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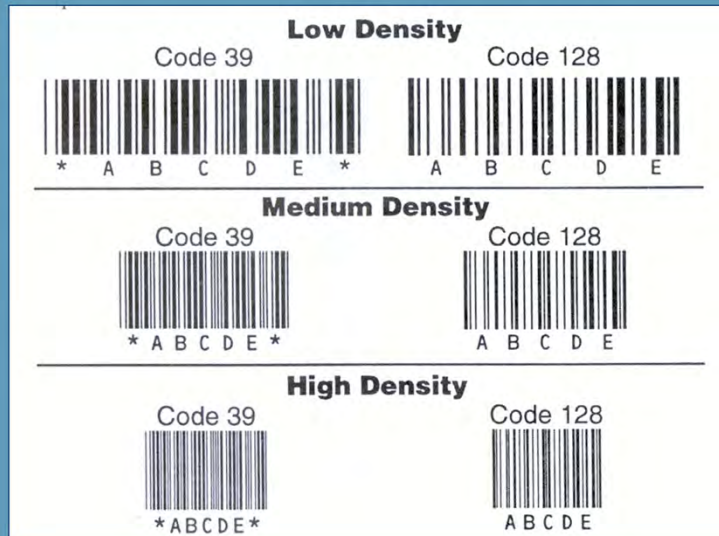
A bar code, most simply, is a series of vertical lines, made up of bars, and spaces. Combinations of these elements in varying widths represent different characters. There are several barcode languages or symbologies, some of which are familiar to anyone, such as the UPC barcode seen on products at the supermarket.

# BARCODE SYMBOLOGIES



Each symbology has different parameters –what alpha and or numeric characters it will read, how many characters it can contain and how big or small the size. Barcodes must be printed and the different symbologies affect the printing as well.

# BARCODE DENSITY



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The wider the bars and spaces, the longer the barcode and the lower the density. Some symbologies allow for shorter, that is more dense, barcodes. This affects what kind of printing technology you use.

## HOW READERS WORK



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Once your barcode is printed it needs to be read. When a scanner is passed over the barcode, the light source from the scanner is absorbed by the dark bars and is reflected by the light spaces. A photocell detector in the scanner receives the reflected light and converts the light into an electrical signal. The duration of the electrical signal determines wide vs. narrow elements. This signal is then 'decoded' into the characters that the barcode represents. Most often, these days, the decoder is built-in to the scanner.



## SCANNABLE FIELDS IN PEST EVENTS SCREEN

**Pest Events**

Trap: 08-191 AMNH SELECT 1.4  
Pinned On: 1/27/2012 Retrieved On: 1/27/2012

Common Name: [text box]

Pest Taxonomy: [Modify Taxonomy](#)

GenusName	FamilyName	OrderName	EcoType	Association

Quantity: [text box] Lifestage: [dropdown] Ad.A: [dropdown]

Dust Cover: 0.243 [dropdown] Species: [text box]

Comments: [text box] **Close Form**

Record: 11 | 1207 of 1207

- Trap name
- Pest common name
- Quantity
- Lifestage
- Dust Cover



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AMNH developed the *Pest Manager Database* with fields that work with drop down menus or manual data entry. We didn't want to eliminate those options, but in working with the database for several months we determined that five data fields in the Pest Event screen were used often enough that they would benefit from faster input. These were the Trap name, Pest Common Name, Quantity, Lifestage and Dust Cover fields. We also changed the Pest Events screen to accept the scannable information in this order.

## IN LAB



- Pros
  - Microscope
  - Good lighting
  - More space to work
- Cons
  - Less convenient
  - More time consuming?
  - Risk of something crawling off trap

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Next we examined our work practices to determine what kind of reader we wanted to use. The first question was whether we wanted bring the traps back to the lab using a microscope to identify our captures, or...

## IN-SITU



### Pros

- Convenient
- Fast
- Less messy

### • Cons

- Poor lighting
- Lower magnification
- Possibly less accurate
- Less space to work

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did we want to do the data entry in situ – meaning where the traps are located in the storage areas. I tended to work in-situ with a Rubbermaid cart to hold my supplies so we first started to investigate options that would be small and portable.

## PORTABLE POCKET PC



- Compaq iPAQ 3630
  - \$600
- ISC Socket in-hand scan card attachment & accessories
  - \$350
- Pros
  - portable
- Cons
  - Hard to direct laser
  - Added extra step

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We already owned a handheld Pocket PC, which with the addition of a scan card attachment, became a mobile scanner. But during trials we realized that the laser beam on the scanner could not be accurately aimed at lists of barcodes. The scans were not always accurate and so the data entry was finicky. Additionally, the *PMD* is a desktop application, not suitable for installation on the handheld unit. Data collected in the handheld was stored in a spreadsheet program, and then downloaded into the database on the desktop computer, effectively adding an extra step. This setup would also be expensive for AMNH to purchase.

## WAND READER



- Wasp Bar Code Wand
- Reader & Decoder
  - \$100
- Wasp Bar Code USBi interface
  - \$80

### Pros

- Reasonably priced

### Cons

- Low resolution
- Unreliable scans

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After speaking with Neil we decided that entering data directly into the *PMD* would be more practical. Mobility could still be achieved by putting the program on a laptop computer. The next test utilized a wand reader. Wand or pen scanners are placed onto the bar code and moved across the surface by the user. This is one of the oldest scanning technologies, but not consistently reliable. The resolution on this particular reader was too low to read the longer bar codes without several passes, and for unknown reasons, it failed entirely to read bar codes shorter than  $\frac{3}{4}$ " in length. The wand also really needed a hard working surface so it proved awkward to use as a portable tool.

## LASER SCANNER

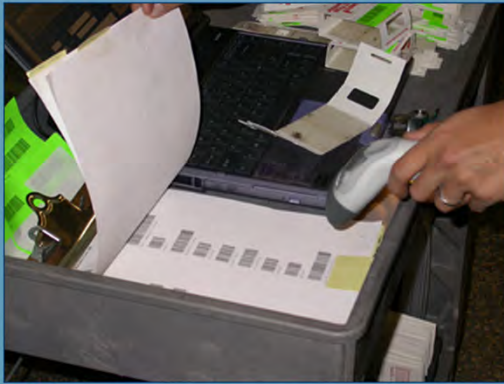


- Symbol LS400i Triggered Laser Scanner
  - \$350
- 650 nm laser & working range of 16 in.
- Pros
  - Quick & easy to use
- Cons
  - Expensive
  - Features like good working range unnecessary

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We moved on then to a laser beam scanner<sup>[1]</sup>. Laser scanners read the bar code using a beam of light that sweeps across the surface. This scanner had no problems reading the bar codes and could be easily and accurately aimed. During our research though we realized that we could reduce the money spent on a scanner by giving up some of the working range and moving to a CCD scanner.

## CCD SCANNER



- Symbol CCD (charge coupled device) scanner
  - \$
- Pros
  - Quick & easy to use despite limited depth of field
  - Reasonably priced

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A CCD is similar to the laser scanner but the potential drawback is the limited depth of field, which requires the scanner to be placed much closer to the code to get a read. But this has worked well with the barcode labels and sheets we have tested and greatly reduced costs.

## GOALS FOR BARCODING



- Create a worksheet for common entries
- Self-adhesive barcode labels for sticky traps



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While we were experimenting with scanners we were also investigating cost effective barcoding software. We had two goals for barcodes. We wanted to create a worksheet with the most common pest names, quantities, lifestage and dust cover entries for easy use. And we also wanted to print self-adhesive barcode labels for the trap locations to put on our sticky traps.

## CHOICE OF SYMBOLOGY

- Code 128

- Pros

- Capable of high density barcodes
- Supports full ASCII 128 character set

- Cons

- Not readable by all scanners

- Code 39

- Pros

- Widely used and supported by readers

- Cons

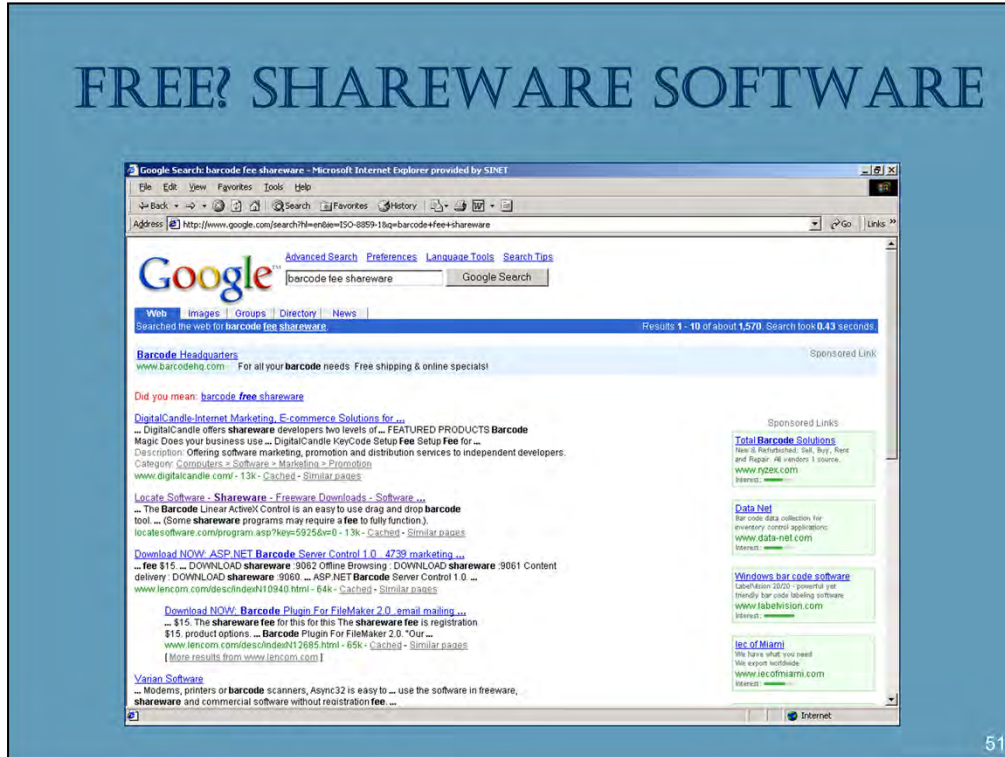
- Less dense – longer barcodes
- Does not always support full character set



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Our choice of barcode symbology quickly narrowed down to two: Code 39 and Code 128. The decision to go with Code 128 barcodes was based on our need for a high-density code to squeeze our long trap location names onto a reasonably sized sticker. Furthermore, when we looked at the way both AMNH and NMAI labeled their room and trap locations we realized that we needed the complete ASCII 128 character set, which Code 39 does not support.

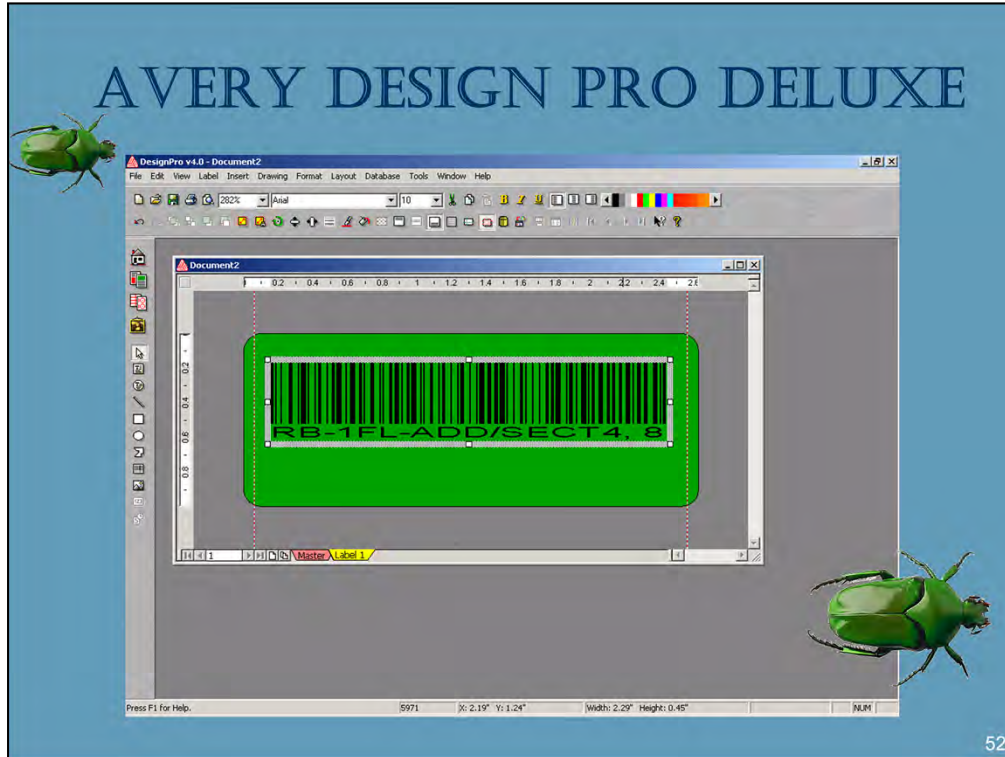
# FREE? SHAREWARE SOFTWARE



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Our first experiments in creating labels and worksheets with free downloaded 'share-ware' barcode fonts from the web were unsatisfactory. Most font packages weren't really free. Some worked fine in notepad but were corrupted when imported and formatted in a Word document.

# AVERY DESIGN PRO DELUXE

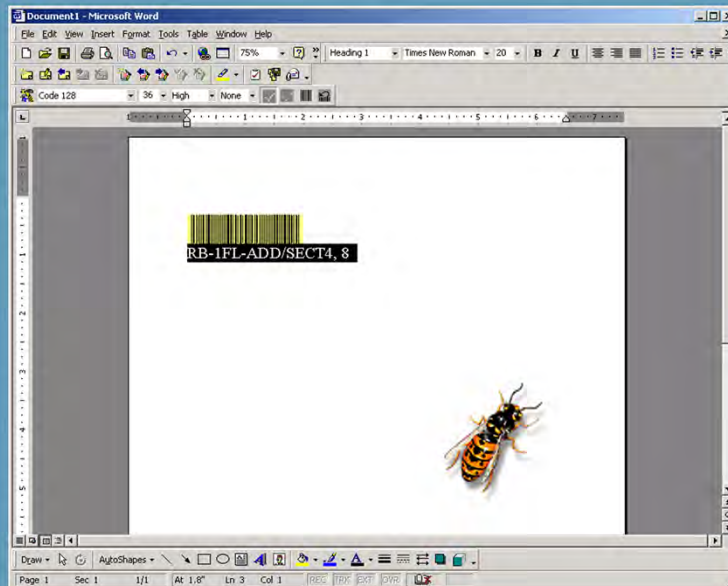


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Next we purchased the Avery DesignPro Deluxe software program<sup>[1]</sup>. This program easily created sheets of labels with one problem – they didn't scan properly despite the assertions on the box. After more than 3 months of phone calls, and e-mail correspondence with Avery Technical Support they admitted that there was a problem with this aspect of the software and that nothing could be done until the next upgrade was released in the following year.

<sup>[1]</sup> Picture of box or printscreen?

# WASP FONTWARE



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We finally found a program that was less user friendly but after a short learning curve produces reliable working barcodes. The Wasp Fontware program works with Microsoft Word and can produce labels in documents or label form.

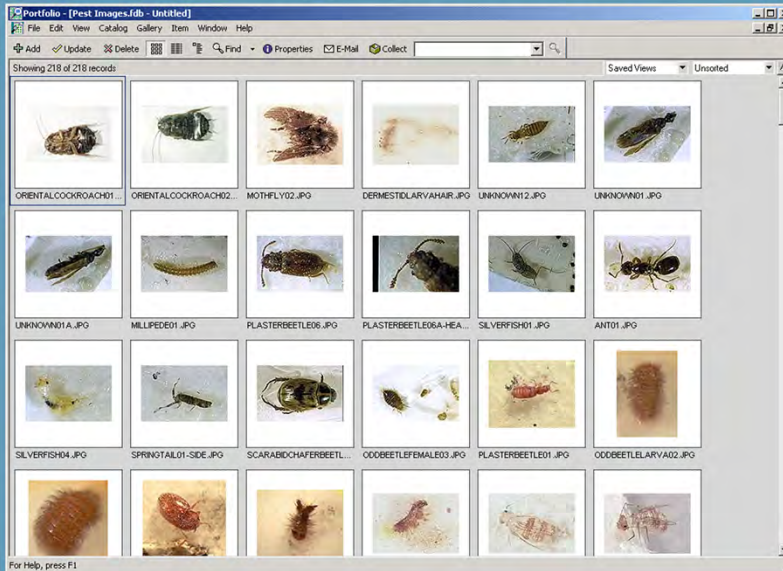
## STICKY TRAP LABELS



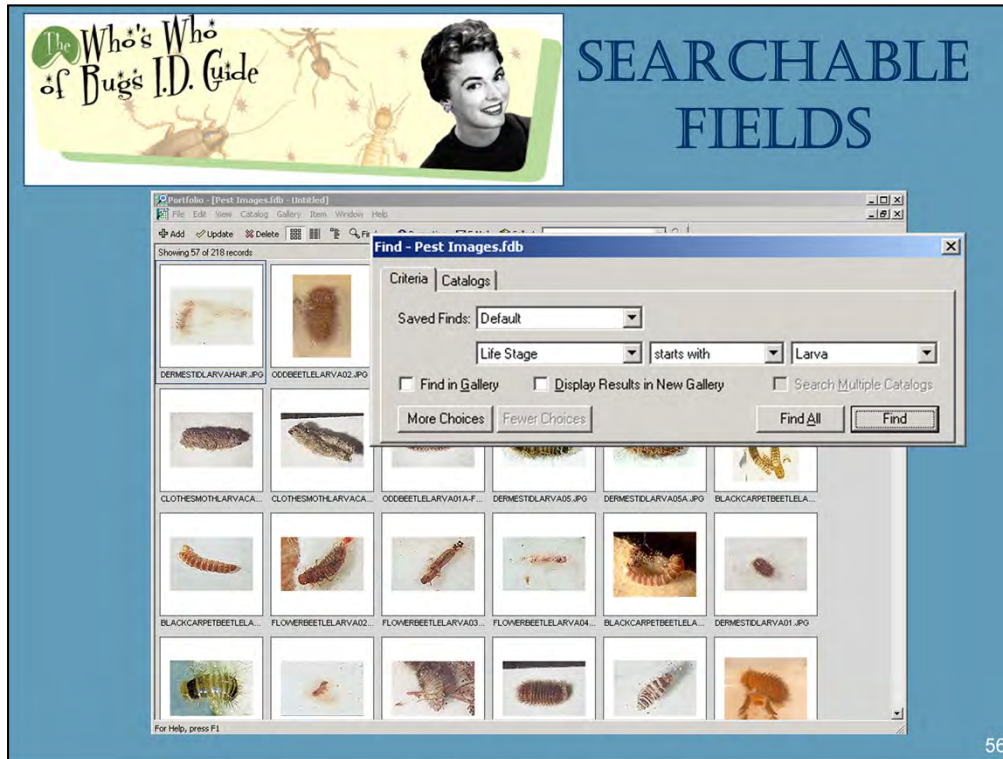
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We now have bright neon green labels for our sticky traps, which can be printed out each month and update automatically with the date of placement. We increased our inspection frequency from bi-monthly to monthly and are currently averaging about 9.7 hours per round. A scanner and software were recently given to AMNH and we hope that we will be able to help them get up and running soon to test for increased efficiency using the barcoding system.

# EXTENSIS PORTFOLIO Image Database

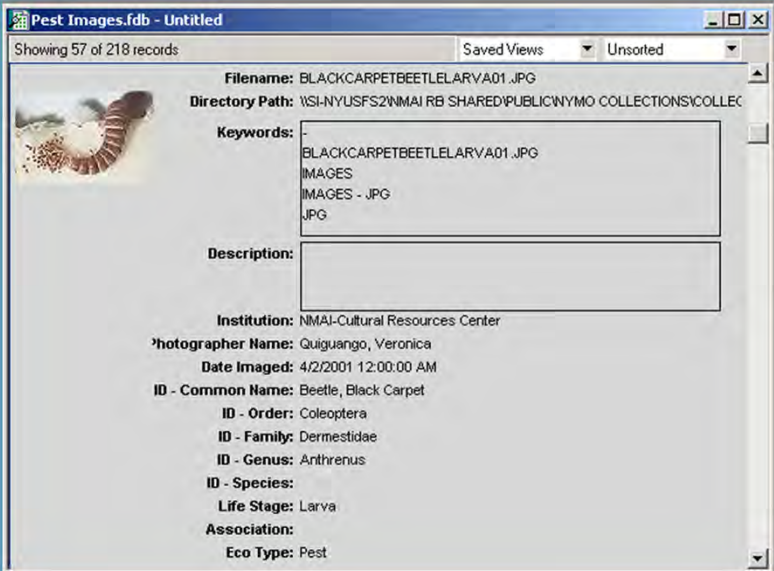


The last element of our collaboration with AMNH was a database of pest images. This has been done using Extensis Portfolio, the same image database program mentioned in the earlier NMAI talk.



The Extensis Portfolio program allows thumbnail images to be searched using associated metadata such as common and scientific names, life stage, and eco type and environmental association factors as listed in the *PMD*. So far AMNH and NMAI have collected 218 pest images from sticky traps.

# ASSOCIATED METADATA



The screenshot shows a database window titled "Pest Images.fdb - Untitled" with a status bar indicating "Showing 57 of 218 records". The window displays metadata for a specific record. On the left, there is a small thumbnail image of a black carpet beetle larva. The metadata fields are as follows:

- Filename:** BLACKCARPETBEETLELARVA01.JPG
- Directory Path:** \\SI-NYUSFS2\NMAI RB SHARED\PUBLIC\WYMO COLLECTIONS\COLLEC
- Keywords:** BLACKCARPETBEETLELARVA01.JPG, IMAGES, IMAGES - JPG, JPG
- Description:** (Empty text box)
- Institution:** NMAI-Cultural Resources Center
- Photographer Name:** Guiguango, Veronica
- Date Imaged:** 4/2/2001 12:00:00 AM
- ID - Common Name:** Beetle, Black Carpet
- ID - Order:** Coleoptera
- ID - Family:** Dermestidae
- ID - Genus:** Anthrenus
- ID - Species:**
- Life Stage:** Larva
- Association:**
- Eco Type:** Pest

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We hope to eventually make this much more comprehensive by adding more in-house shots and images of scientific drawings from published references and associating more information with each image. The pictures can easily be called up and searched to aid in identification during data entry.

## THE PROSCOPE USB Microscope

As seen on the  
hit CBS TV Series  
**CSI**  
and CSI MIAMI!

MAC OS X JAGUAR 10.2  
WINDOWS XP  
drivers & application  
NOW AVAILABLE!  
click here!

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We'd like to also briefly show you another hi-tech tool that we recently purchased and anticipate finding useful to aid in identifying and imaging pests. The Proscope is a small microscope that hooks into a computer's USB port. It comes with interchangeable lenses and allows you to easily view and capture images with its compatible software.

# MAGNIFICATION & IMAGING



10x magnification



50x magnification



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Although the Proscope was initially marketed as a teaching tool for elementary schools it has caught on as a forensics tool and according to the New York Times is popular in the FBI and law enforcement communities. The 10x lens produces nice images and the 50x lens gives outstanding detail.

## CONCLUSIONS PMD HAS ALLOWED FOR...

- Associated data to explain context of pest captures
- Increasing data manageability
- Better visualization of trends
- Customizable for different facilities



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The use of the *PMD* has allowed us to associate more information to better understand the context of our pest captures as well as increasing manageability and visualization. Running queries consistently corroborates the pest trends that we have noticed over the years. Our main Collections storage facility in Suitland, Maryland is currently planning to customize the maps and location lists for their facility to use the modified *PMD*, and we're looking forward to setting up our remaining facilities in NY and Washington, DC soon.

During conversations amongst AMNH and other interested people such as Richard Monk and Tom Strang of CCI there is much interest in future developments for pest monitoring databases. We hope in the upcoming months to distribute a questionnaire over the NHCOL listserv to assess interest in other institutions for a more widely applicable program of this type.



## FUTURE DEVELOPMENT?

- Survey of interest in databases for pest management
- IPM list serve for discussion and updates on future developments
  - Send e-mail to [listserv@zaks.com](mailto:listserv@zaks.com)
  - In body of message type “subscribe pmd your\_full\_name”

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### References

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**Mallis, A., 1997.** *Handbook of Pest Control* (6<sup>th</sup> Edn.). Mallis Handbook and Technical Training Company.