

The Accidental IPM Program

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The Andy Warhol Museum

- Opened in 1994 in Pittsburgh
- Originally built in 1911 as an industrial warehouse
- A collaborative project between the Carnegie Institute, The Dia Art Foundation, and the Andy Warhol Foundation for the Visual Arts





Collections

Over 12,000 works of art, 2,500 film and video elements, and an extensive archive of over 500,000 items combine to make the world's most comprehensive single-artist museum.



The Time Capsules

612 boxes created by Andy Warhol. Although the contents are archival in nature, the *Time Capsules* are considered to be Warhol's most extensive, complex and personal work of art.

Typical contents found in the *Time Capsules*



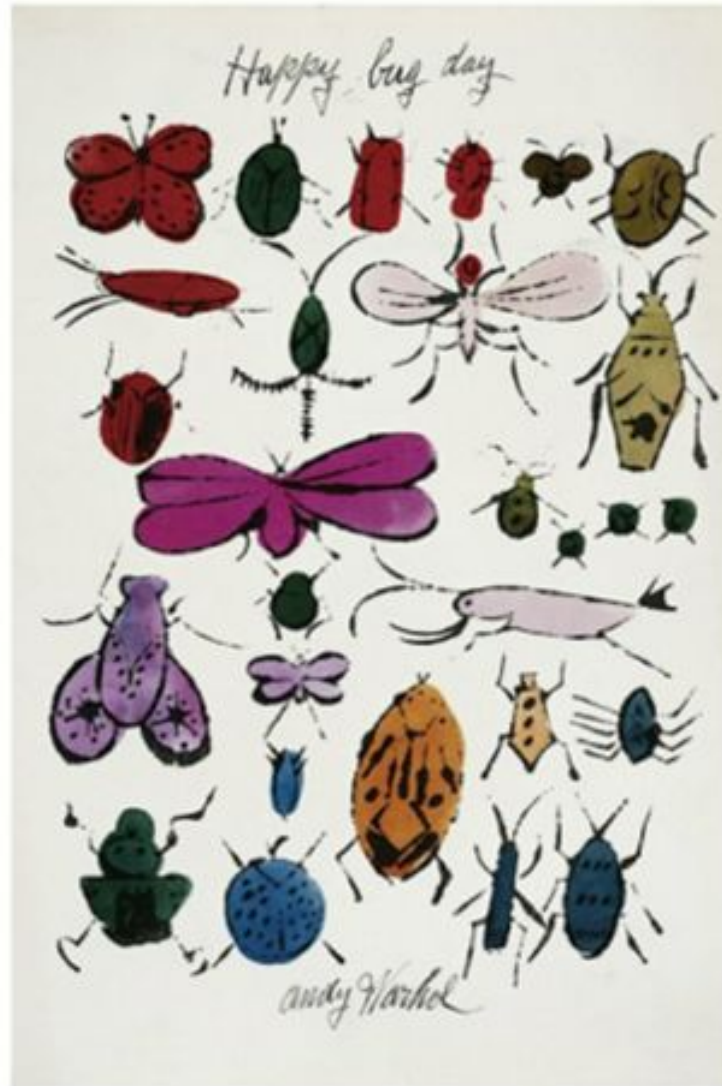
The cataloging process

- Three full-time catalogers were hired as part of a six-year project funded by The Andy Warhol Foundation for the Visual Arts and the Institute of Library and Museum Services to open, organize, and catalog every *Time Capsule*.
- Basic preservation actions completed along the way.



Not-so-Happy Bug Day

- Summer of 2011 – active infestation discovered
- No IPM program existed.
- No staff member officially appointed to lead IPM activities.
- Pest evidence found in *Time Capsules* was thought to be part of an earlier, treated infestation.





Immediate response

Entire collections processing area cleaned from top to bottom. Every piece of furniture moved and cleaned.



Post-cleaning

Processing area completely cleaned. Carpeting removed. Area prepared for processing all of the supplies and collections items that had been stored in the room.



3rd Floor closed to public

Entire floor closed to allow adequate room for clean up and processing infested materials.



Infested items

Everything in the space was sealed in plastic. Infested materials sealed to keep bugs in, clean materials sealed to keep bugs out. Infested supplies were discarded.



Infested *Time Capsules*

The *Time Capsules* are known to contain items that would attract pests. Unfortunately, many of the boxes had not yet been cataloged.

Option 1

- Continue regularly-scheduled cataloging project
- Address pest issues when they are discovered
- Risk spread of pest activity in the meantime and potential loss of collection materials

Option 2

- Suspend cataloging
- Open all *Time Capsules* as quickly as possible
- Isolate objects that are attracting pests (food, cosmetics, etc.)
- Remove objects that cannot be frozen; cycle boxes through freezer
- Deal with tracking un-cataloged, un-numbered collection objects



Option 2

3rd floor remained closed as each *Time Capsule* was inspected for signs of pest activity.

TC522

Time Capsules IPM Survey Sheet

Box Number: TC522		Box Location: Archives Storage		Date Opened for Survey: 9/28/2011		Surveyor(s): Elaine White, Mark Eha	
Cataloged? <input type="checkbox"/>		Already opened? <input type="checkbox"/>		Pests Found? <input checked="" type="checkbox"/>		Live Bugs? <input type="checkbox"/>	
				Type of Pests Found: Carpet beetle larvae and eggs, 1 tick		Action Required at Box-Level? <input checked="" type="checkbox"/>	
						Quick Process? <input type="checkbox"/>	
						Food? <input checked="" type="checkbox"/> Bubble wrap? <input checked="" type="checkbox"/>	
Description of Action Required at Box-Level: To be frozen							
Box-Level Notes: Box was opened when retrieved, opened by Mark Eha on 9/28/11.							
Preservation Notes: TC522-12 5/20/11; Beeswax Tapers set (TC522-4), Kathi Nading drawings (TC522-4; TC522-8), and Scotty Schaaf painted ballroom (TC522-44) were wrapped separately and placed in TC Overlaid Storage (CS18, Unit 0, Shelf 00).							
TC Item Number	Folder	Drawer	Object Description	Action Required	Date of Discovery	Reason for Discovery	Next Location
TC522-12a			pinkish fabric photo	Prep <input checked="" type="checkbox"/>	9/28/2011	prep	Prep
				<input type="checkbox"/>			
TC522-10a- TC522-10e			Kit Cracks and the Countup LP	Hand-cleaning <input checked="" type="checkbox"/>	9/28/2011	Do not freeze	Do Not Freeze
TC522-12-1a- TC522-12-8			Platy Glass LP	Hand-cleaning <input checked="" type="checkbox"/>	9/28/2011	Do not freeze	Do Not Freeze
TC522-12-1a- TC522-12-8			Platy Glass LP	Hand-cleaning <input checked="" type="checkbox"/>	9/28/2011	Do not freeze	Do Not Freeze
TC522-151-1- TC522-151-2			Plastic Transformer set	Hand-cleaning <input checked="" type="checkbox"/>	9/28/2011	Do not freeze	Do Not Freeze
TC522-151-1- TC522-151-2			Plastic Transformer set	Hand-cleaning <input checked="" type="checkbox"/>	9/28/2011	Do not freeze	Do Not Freeze
TC522-154			Metal books	Hand-cleaning <input checked="" type="checkbox"/>	9/28/2011	Do not freeze	Do Not Freeze
TC522-154			Metal books	Hand-cleaning <input checked="" type="checkbox"/>	9/28/2011	Do not freeze	Do Not Freeze
TC522-12a- TC522-12e			Spoke top	Hand-cleaning <input checked="" type="checkbox"/>	9/28/2011	Do not freeze	Do Not Freeze
TC522-11			Urn LP	Hand-cleaning <input checked="" type="checkbox"/>	9/28/2011	Do not freeze	Do Not Freeze



Isolation bins

Gasketed, air-tight bins now hold all of the food, cosmetics, medications, tobacco, and candies found in the *Time Capsules*. Items are double-bagged before being placed in the bins.



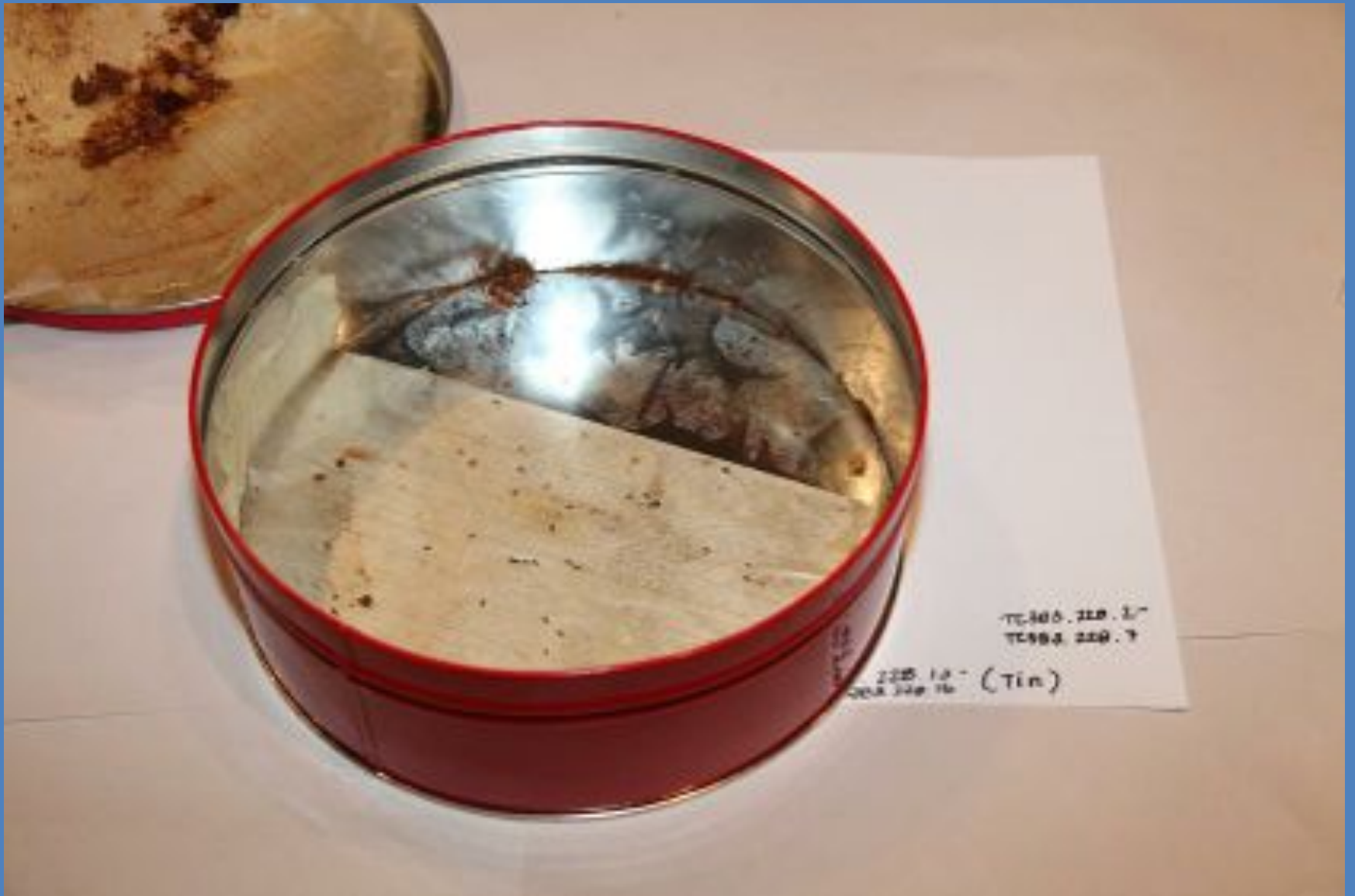
The *Time Capsules* today

Each is sealed in plastic and marked with a color-coded label indicating its infestation and/or treatment status

From this point on, this presentation gets pretty gross. You have been warned.



Typical *Time Capsule* object – a seemingly empty cookie tin.



Trace amount of food residue is enough to attract pests.



TC 415
9/26/11

An entire box full of cookies is now full of carpet beetle larvae.





Chocolate items were reduced to dust.





Paper objects damaged by beetles searching for food.



Multiple generations of an active carpet beetle infestation.



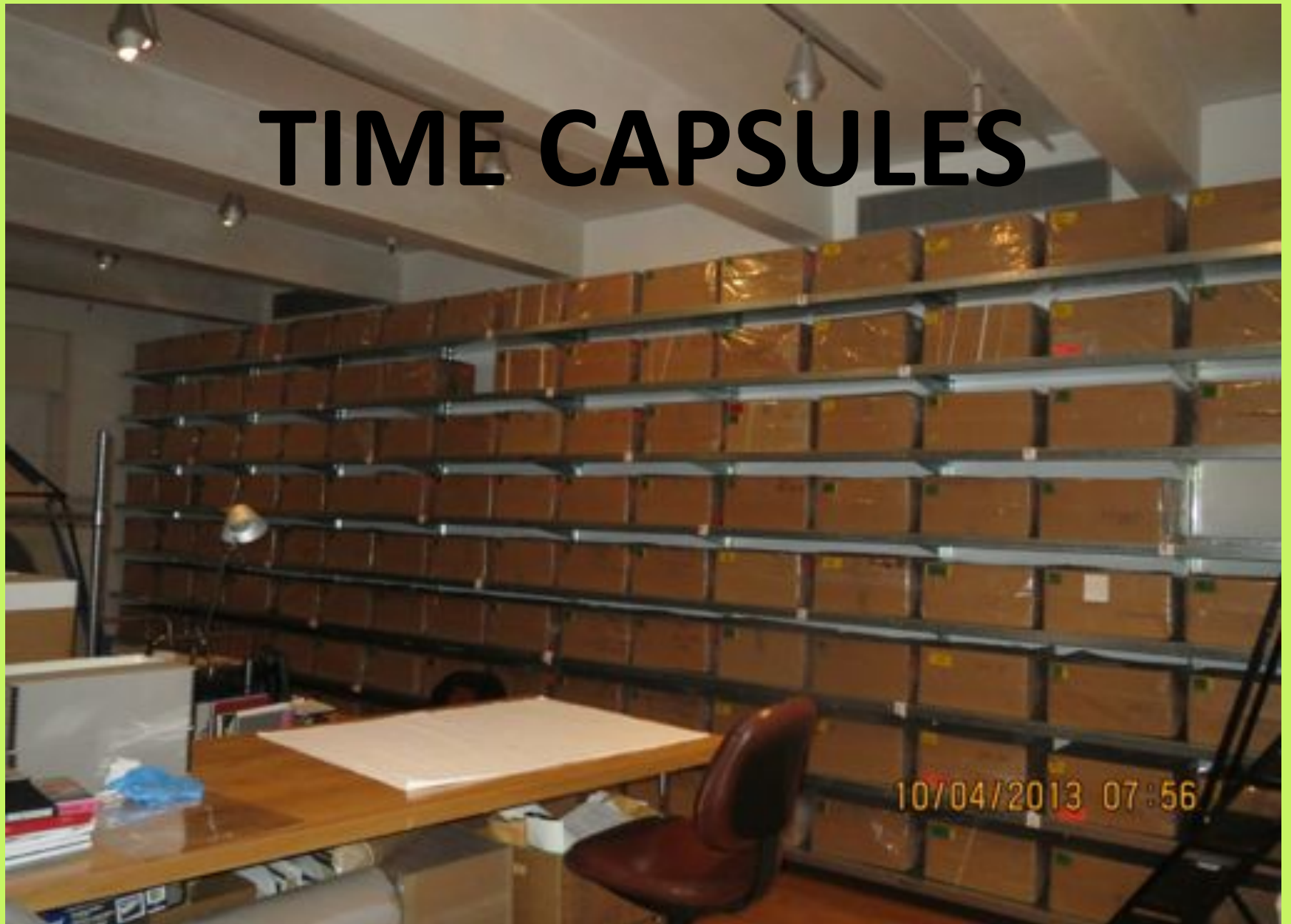
Beetle casings on the surface. Backlighting reveals holes in this small canvas found in a *Time Capsule*.

Transition from project to program

- The *Time Capsule* clean up work was done without an IPM program in place.
- Used Museumpests.net templates to create a full IPM Policy and Procedures document.
- Allowed staff to approach the rest of the collections in a more systematic, sustainable way.



TIME CAPSULES



ARCHIVES COLLECTION





RISK

“We’re gunna need a bigger boat.”

TIME CAPSULES IN ARCHIVES STORAGE



10/04/2013 14:02

MITIGATION STRATEGY IN ARCHIVES STORAGE

- A. Preservation survey with statistics
- B. “Plus One” mitigation plan
- C. Re-housing
- D. Housekeeping & Containment

PRESERVATION SURVEY WITH STATISTICS

- 1) Random sampling of the entire Archives Collection.
- 2) Targeted sampling of at-risk collection items.
- 3) Prioritization sequence for mitigating high-risk collections.



TARGETED SAMPLING

IMLS - SUMMARY TABLE OF SURVEY DATA USED TO CREATE THE PRIORITIZATION SEQUENCE FOR PROCESSING COLLECTION BOXES IN ARCHIVES STORAGE **THE ANDY WARHOL MUSEUM**


DATE: 1/11/2013
STATUS: COMPLETE

NOTES: The following tables present a summary of the statistical data collected during the pest mitigation project. (The full results along with the processing notes are documented in two spreadsheets: "Mitigation Notes & Plan.xls" and "Survey Form - Phase III.xls".) The purpose of the tables is to present data in a concise and useful manner in order to facilitate a prioritization sequence for continuing to mitigate the high-risk collection boxes housed in Archives Storage. In the interest of presenting easily readable tables, data gathered from surveying other Archives collection boxes (approximately 1183 boxes) that face less risk of infestation has been omitted. Some data was derived from: <http://www.surveysystem.com/sscalc.htm>.

PRESERVATION ISSUES IDENTIFIED									
	Number of boxes identified in the Survey of Fall 2011.	Number of boxes inspected and / or mitigated to date.	Percentage of boxes inspected and / or mitigated.	Confidence Interval (lower % = greater accuracy). (Confidence Level = 95%.)	Number of boxes with signs of infestation.	Percentage of boxes with signs of infestation.	Percentage (and total count) of boxes containing vulnerable collection items.	Percentage (and total count) of boxes NOT archival grade.	Percentage of boxes NOT using archival grade materials and / or standard techniques.
LEGACY BOX CATEGORIES FOR AT-RISK COLLECTIONS***									
B-Boxes	212	53	25.0%	11.7%	11	20.8%	52.8%	54.7%	92.5%
M-Boxes	126	22	17.5%	19.1%	4	18.2%	27.27%	100.0%	100.0%
Misc-Boxes	119	19	16.0%	20.7%	4	21.1%	47.4%	68.4%	68.4%
Idea-Boxes	41	7	17.1%	34.2%	1	14.3%	85.7%	100.0%	100.0%
C-Boxes	52	21	40.4%	16.7%	0	0.0%	100.0%	9.5%	47.6%
Clothing/Textiles-Boxes	118	21	22.0%	17.0%	2	7.7%	100.0%	26.9%	38.5%
Other-Boxes	63	9	14.3%	30.5%	1	11.1%	11.1%	55.6%	66.7%
AME-Boxes	99	22	22.2%	18.5%	2	9.1%	18.2%	90.9%	90.9%
G-Boxes	6	6	100.0%	0.0%	0	0.0%	100.0%	100.0%	100.0%
ACE-Boxes	63	10	15.9%	28.7%	0	0.0%	0.0%	50.0%	80.0%
OSE-Boxes	28	6	21.4%	36.1%	0	0.0%	0.0%	83.3%	83.3%
Realia-Unboxed Items	25	11	44.0%	22.6%	4	36.4%	36.4%	100.0%	100.0%
WEIGHTED AVERAGES, TOTALS OR PREDICTED COUNTS	952	207	21.7%	6.0%	29	14.0%	448	612	751

***Legacy box categories are derived from the original gift register and may indicate the origins and / or contents of the boxes.

PRIORITIZATION SEQUENCE

	Number of boxes identified in the Survey of Fall 2011.	Number of boxes inspected and / or mitigated to date.	Percentage of boxes inspected and / or mitigated.	Confidence Interval (lower % = greater accuracy). (Confidence Level = 95%.)	Number of boxes with signs of infestation.	Percentage of boxes with signs of infestation.	PROCESSING PLAN FOR NEXT PHASE: Number of additional boxes to be mitigated in order to reduce the the Confidence Interval for each box category to $\leq 13\%$. (Reducing the Confidence Interval decreases the margin of error and results in greater accuracy for predicting the probability of infestation.)
BREAKOUT DATA FOR HIGH-RISK BOX CATEGORIES							
B-Boxes	212	53	25.0%	11.7%	11	20.8%	0
M-Boxes	126	22	17.5%	19.1%	4	18.2%	17
Misc-Boxes	119	19	16.0%	20.7%	4	21.1%	20
Idea-Boxes	41	7	17.1%	34.2%	1	14.3%	17
Realia-Unboxed Items	25	11	44.0%	22.6%	4	36.4%	7
WEIGHTED AVERAGES, TOTALS OR PREDICTED COUNTS	523	112	21.4%	8.22%	24	21.4%	61

“PLUS ONE” MITIGATION PLAN

CS08 - BOXES TO BE MITIGATED					OLD	MITIGATION		NEW BOX		
BOX	REASON	LOCATION	BOX CATEGORY	BOX TYPE	BOX SIZE	DATE	PROCESS	SIZE	TBD / NOTES	
B021	infested	CS08; A; 07	B-box, compressed	bankers	12 x 15 x 10	5/9/2012	FULL	Standard	moths?	
B020	adjacent to B021	CS08; A; 07	B-box, compressed	bankers	12 x 15 x 10	5/10/2012	Quick	Standard		
B019	shares shelf with B021	CS08; A; 07	B-box, compressed	bankers	12 x 15 x 10	5/10/2012	Quick	Standard		
B029	infested	CS08; B; 02	B-box, compressed	bankers	12 x 15 x 10	5/8/2012	FULL	Standard	LIQUIDS	
B030	adjacent to B029	CS08; B; 02	B-box, compressed	bankers	12 x 15 x 10	5/9/2012	Quick	Standard		
B028	adjacent to B029	CS08; B; 02	B-box, compressed	bankers	12 x 15 x 10	5/9/2012	Quick	Standard		
B054	infested	CS08; C; 03	B-box, compressed	bankers	12 x 15 x 10	4/30/2012	FULL	Standard	Liquids	
B053	adjacent to B054	CS08; C; 03	B-box, compressed	bankers	12 x 15 x 10	5/1/2012	QUICK	Standard		
B052	shares shelf with B054	CS08; C; 03	B-box, compressed	bankers	12 x 15 x 10	5/1/2012	QUICK	Standard	Fragile	
B062	infested	CS08; C; 06	B-box, compressed	bankers	12 x 15 x 10	5/2/2012	FULL	Modified Flatbox		
B061	adjacent to B062	CS08; C; 06	B-box, compressed	bankers	12 x 15 x 10	5/3/2012	QUICK	Standard		
B063	adjacent to B062	CS08; C; 06	B-box, compressed	bankers	12 x 15 x 10	5/2/2012	QUICK	Standard	Fragile	
CS09 - BOXES TO BE MITIGATED					OLD	MITIGATION		NEW BOX		
BOX	REASON	LOCATION	BOX CATEGORY	BOX TYPE	BOX SIZE	DATE	PROCESS	SIZE	TBD / NOTES	
Clothing (Loan shares shelf with B021		CS09; A; 07	textile, large	archival	36 x 3 x 22	4/17/2012	Quick	TEXTILE BOX - XL		
Clothing (Loan shares shelf with B021		CS09; A; 07	textile, large	archival	36 x 3 x 22	4/17/2012	FULL	TEXTILE BOX - XL	insect activity found	
Shoes #118	shares shelf with B029	CS09; B; 02	shoe	archival	8 x 12 x 6	4/17/2012	Quick	SHOE BOX		
Boots #117	shares shelf with B029	CS09; B; 02	shoe	archival	8 x 12 x 6	4/17/2012	Quick	SHOE BOX		
Boots #121	shares shelf with B029	CS09; B; 02	shoe	archival	8 x 12 x 6	4/17/2012	Quick	SHOE BOX		
Shoes - Misc	shares shelf with B062	CS09; C; 06	shoe	archival	8 x 12 x 6	4/17/2012	Quick	SHOE BOX		
Shoes - Misc	shares shelf with B062	CS09; C; 06	shoe	archival	8 x 12 x 6	4/17/2012	Quick	SHOE BOX		
Cameras - Pol	shares shelf with B062	CS09; C; 06	other	non-archival	other	4/18/2012	Quick	Standard Box		
B565	shares shelf with B062	CS09; C; 06	B-box, legacy	TC-size	14 X 18 X 10	4/18/2012	Quick	Oversized Box - Long		
Cameras	shares shelf with B054	CS09; C; 03	B-box, compressed	bankers	12 x 15 x 10	4/19/2012	Quick	Standard Box		
Cameras	shares shelf with B054	CS09; C; 03	B-box, compressed	bankers	12 x 15 x 10	4/19/2012	Quick	Standard Box		
Cameras	shares shelf with B054	CS09; C; 03	B-box, compressed	bankers	12 x 15 x 10	4/20/2012	Quick	Standard Box		

RE-HOUSING: EXAMPLE A

BEFORE



AFTER



RE-HOUSING: EXAMPLE B

BEFORE



AFTER



HOUSEKEEPING & CONTAINMENT

TENT

TOOLS & SUPPLIES



MITIGATION STRATEGY - REVIEW

A. Preservation survey with statistics

B. “Plus One” processing plan

C. Re-housing

D. Housekeeping & Containment

PEST MONITORING WITH DOCUMENTATION & DATA ANALYSIS

- A. Trapping concepts**
- B. Diagrams of the trap locations**
- C. “Database” for tracking pest hits**
- D. Inspection log on every trap**

TRAPPING CONCEPTS



“When the light is green, the trap is clean.”

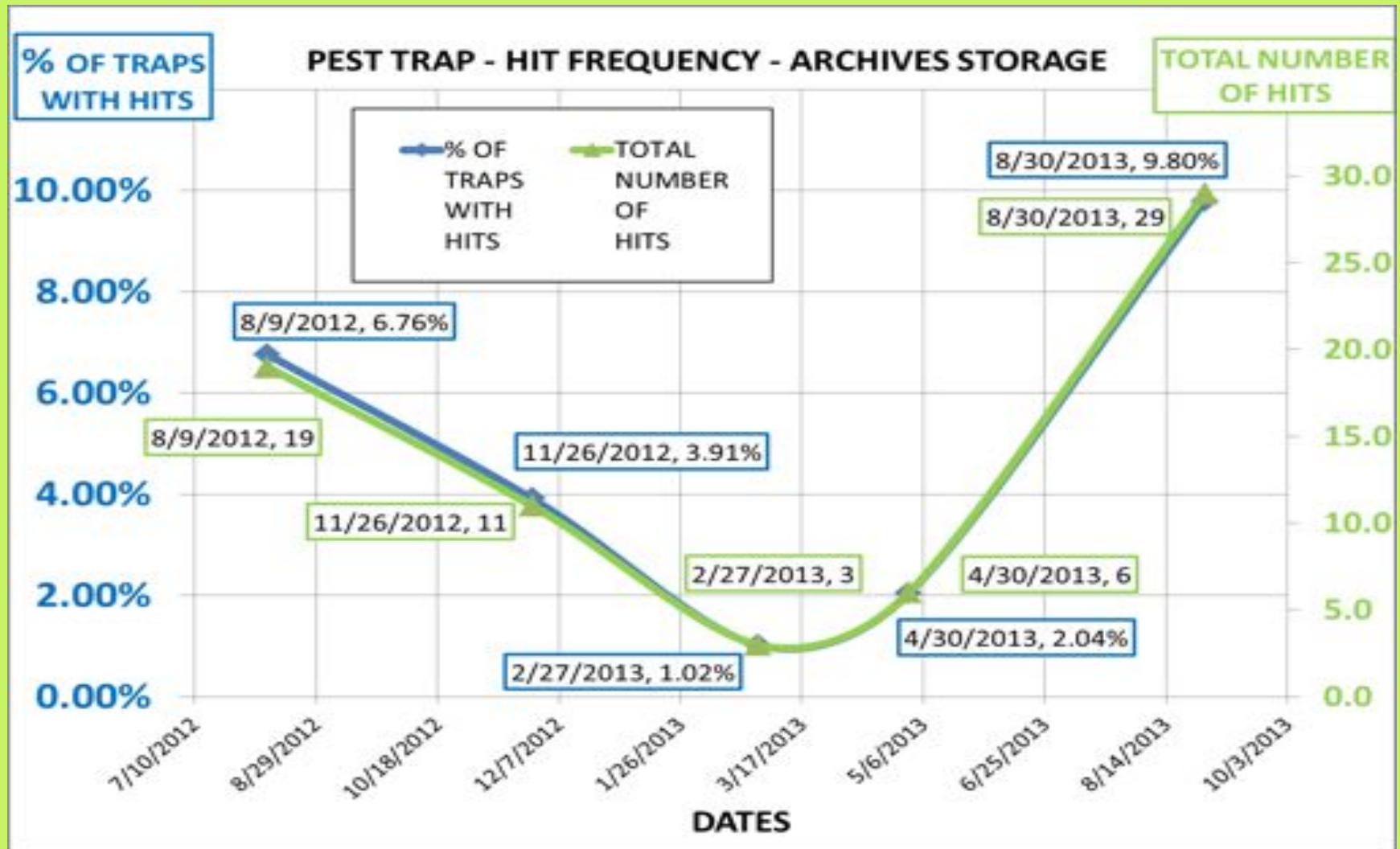
TRAP DIAGRAMS



“DATABASE” FOR TRACKING HITS

COMMON NAME	FAMILY OR SUBFAMILY	GENUS	SCIENTIFIC NAME	RISK FACTOR	PREFERED FOOD SOURCE
Cigarette Beetle	Anodiidae	Lasioderma	<i>Lasioderma serricorne</i>	High	Starches
Drugstore Beetle	Anodiidae	Stegobium	<i>Stegobium paniceum</i>	High	Starches
Black Carpet Beetle	Dermeestidae	Attagenus	<i>Attagenus unicolor</i>	High	Proteins
Varied Carpet Beetle	Dermeestidae	Anthrenus	<i>Anthrenus verbasci</i>	High	Proteins
Minute Brown Scavenger Beetle	Latridiidae		not differentiated	Moderate	Molds
Silverfish	Lepismatidae	Lepisma	<i>Lepisma saccharina</i>	High	Starches
Firebrat	Lepismatidae	Thermobia	<i>Thermobia domestica</i>	High	Starches
Book Lice or Psocids	Liposcelidae	Liposcelis	not differentiated	Moderate	Starches
Powderpost Beetles	Lyctinae	Lyctus	not differentiated	High	Wood
Ant	not differentiated		not differentiated	Low	
Gnats or flies	not differentiated		not differentiated	Low	
Spider	not differentiated		not differentiated	Low	
Moth - other	not differentiated		not differentiated	Low	
Weevil	not differentiated		not differentiated	Moderate	
Beetle - other	not differentiated		not differentiated	Low	
Saw-toothed Grain Beetle	Silvanidae	Oryzaeophilus	<i>Oryzaeophilus surinamensis</i>	High	Starches
Unidentified beetle	TBD	TBD	not identified	High (potential)	
Unidentified larvae	TBD	TBD	not identified	High (potential)	
Unidentified fragments	TBD	TBD	not identified	TBD	
Unidentified insect	TBD	TBD	not identified	TBD	
Casemaking Clothes Moth (CMCM)	Tineidae	Tinea	<i>Tinea pellionella</i>	High	Proteins
Webbing Clothes Moth (WCM)	Tineidae	Tineola	<i>Tineola bisselliella</i>	High	Proteins

BASIC DATA ANALYSIS



INSPECTION LOGS ON EVERY TRAP IN SITU LOG



PEST MONITORING - REVIEW

A. Trapping concepts

B. Diagrams of trap locations

C. “Database” for tracking pest hits

D. Inspection logs on every trap

GOING FROM PROBLEM TO PROGRAM: 5 KEYS TO BEATING IPM CHALLENGES

**#1 KEY: Start simply; grow organically
and customize in iterations.**



VOLUME I

VOLUME II



**#2 KEY:
CAPTURE METRICS**

“But it goes to eleven.”

GOING FROM PROBLEM TO PROGRAM: 5 KEYS TO BEATING IPM CHALLENGES

#3 KEY: Action Thresholds

#4 KEY: Proportional Responses

**Action Thresholds + Decision Matrix =
Proportional Responses to IPM challenges**

DECISION MATRIX

COLLECTIONS
ENVIRONMENT

DIAGNOSTIC
TOOLS

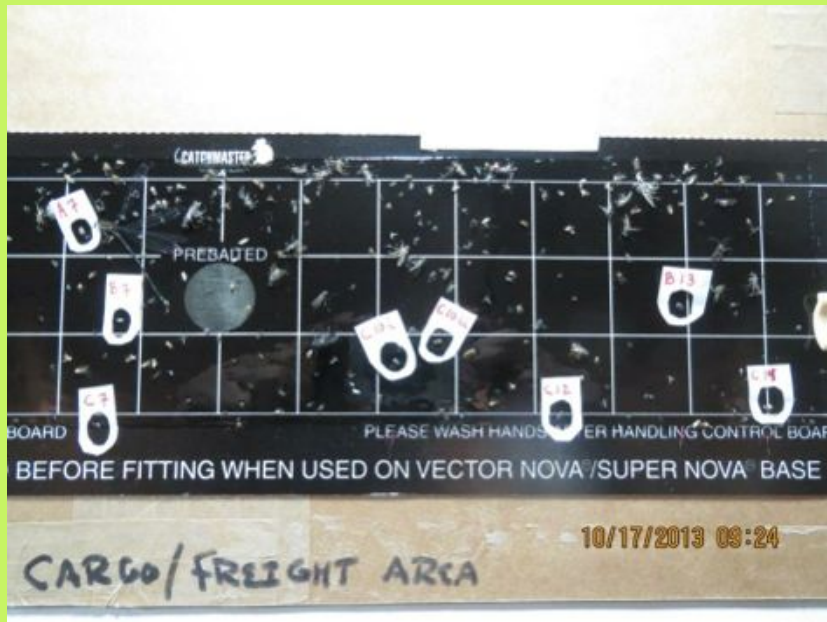
TREATMENT
OPTIONS



#5 KEY: CONTINUOUS IMPROVEMENT

UV LIGHT TRAPS

PASSIVE FUMIGATION



5 KEYS TO BEATING IPM CHALLENGES - REVIEW

1. Start simply
2. Capture metrics
3. Action thresholds
4. Proportional responses
5. Continuous improvement



FAIR USE IMAGE CREDITS

Risk – Jaws, http://www.festival-cannes.com/assets/Image/2013/Articles/Spielberg_heros/Jaws.jpg

Capturing Metrics - This is Spinal Tap, http://taoteaching.files.wordpress.com/2009/11/spinal_tap_but_it_goes_to_eleven1.jpg

Trapping Concepts – Ghostbusters, <http://www.gbfans.com/community/viewtopic.php?f=3&t=19560>

THE ACCIDENTAL IPM PROGRAM[©]

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