

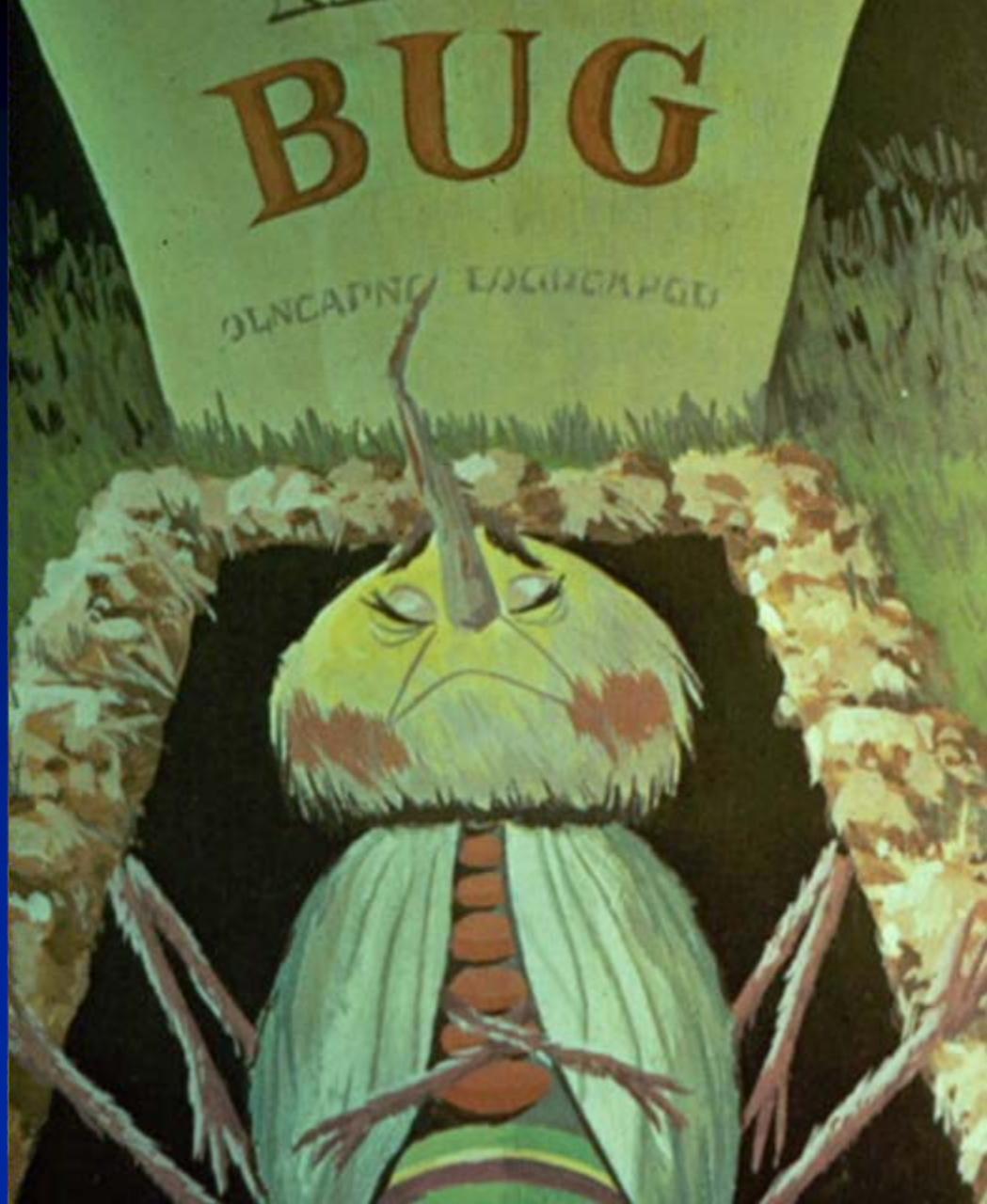
# IPM approaches for Japanese beetles at regulated airports

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T. J. Gibb

**IPM:**  
Phenological  
Regulatory  
Physical  
Mechanical  
Biological  
Chemical  
Cultural

Long term  
control =  
  
Population  
Management



# Phenological :

Keeping your ear to the ground to predict populations numbers, emergence, timing

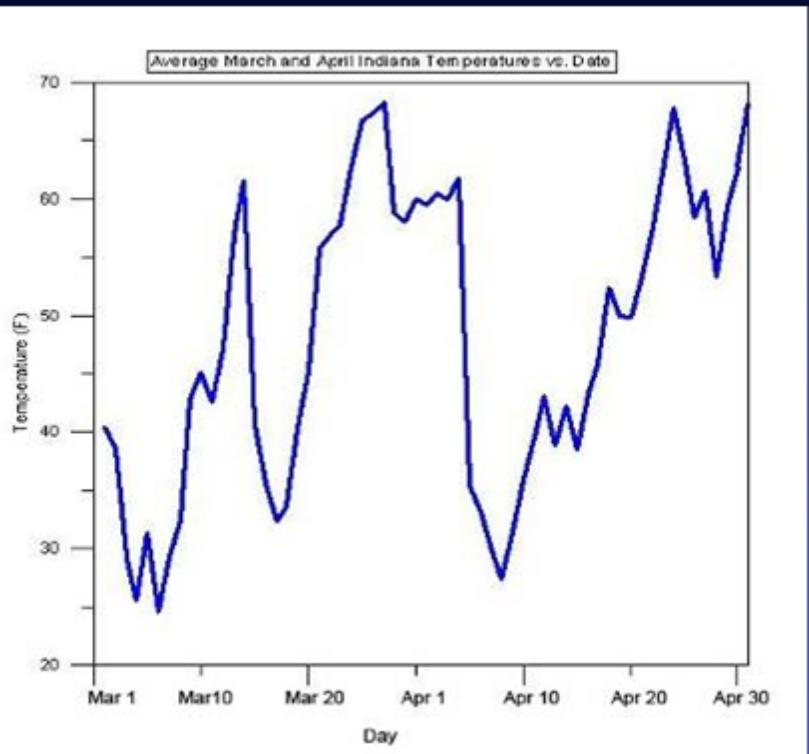
Weather data:  
Temperature  
Precipitation  
Humidity  
Degree day  
accumulations



# IN weather conditions - 2007 and their effect on JB populations

- Mild winter - record high temps in late March and early April
- Record low temps early April; above average temperatures through late September
- Wet weather through May 15 followed by below normal levels of precipitation through October

# Temperature extremes



## March, 2007 All-time Highs (Indy)

13th - Record High, 80 degrees  
25th - Record High, 81 degrees  
26th - Record High for Minimum (Low), 61 degrees

## April, 2007 All-time Low (Indy)

7<sup>th</sup> - Record low for a Maximum (High), 32 degrees

April 8,  
2007

# Frost damage



Tree Lilac  
*Syringa reticulata*



Star Magnolia  
*Magnolia stellata*



## Cold damage to evergreens



Delayed symptom expression

# Temperature effects on JB:

Degree day accumulations in soil (base 10<sup>0</sup> C)  
correlate with first emergence and 50% flight

# Japanese beetle 2007 *mild winter effect*

Beetle emergence = very early  
(June 3rd vs 20th)



Peak early

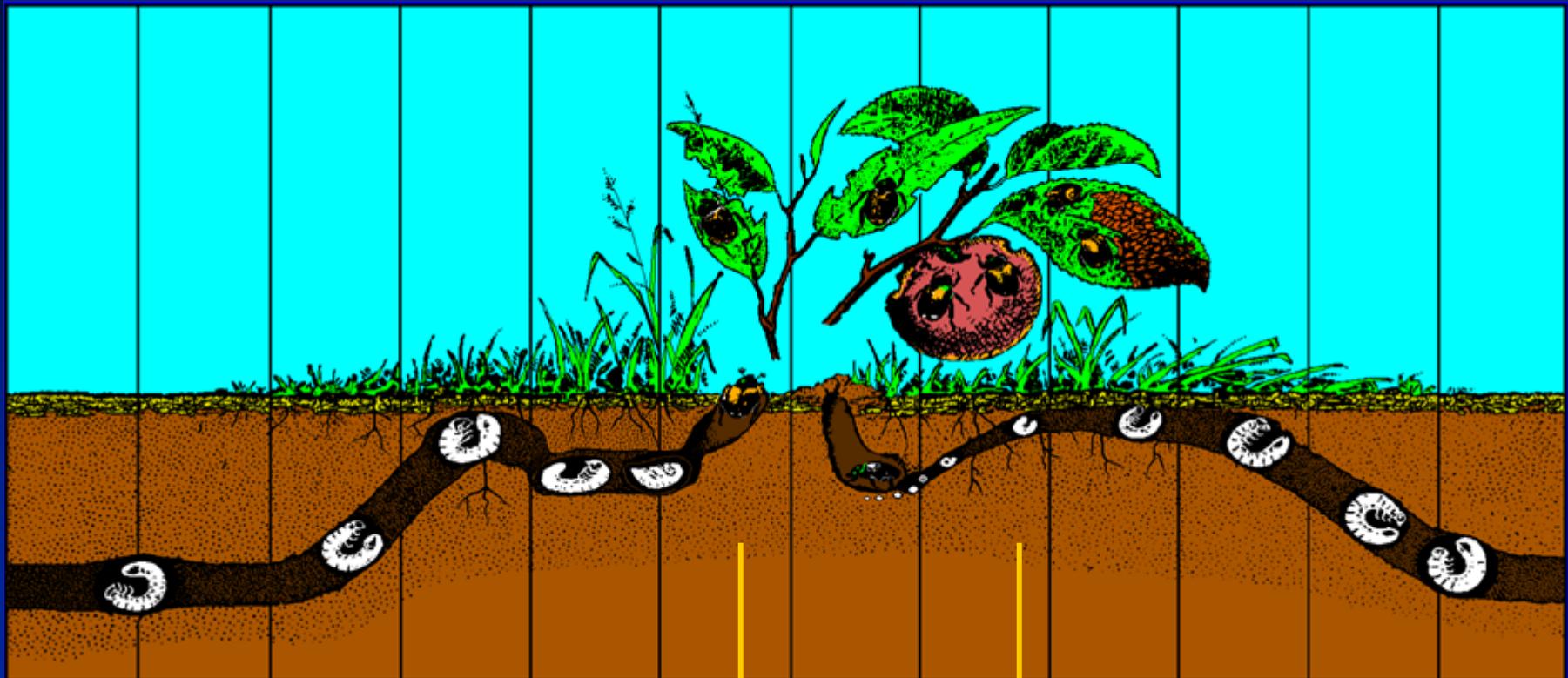
End of adult activity early (early August vs mid)

Egg hatch early

Optimal treatment time = mid-late July

# JB Normal Adult Activity Period

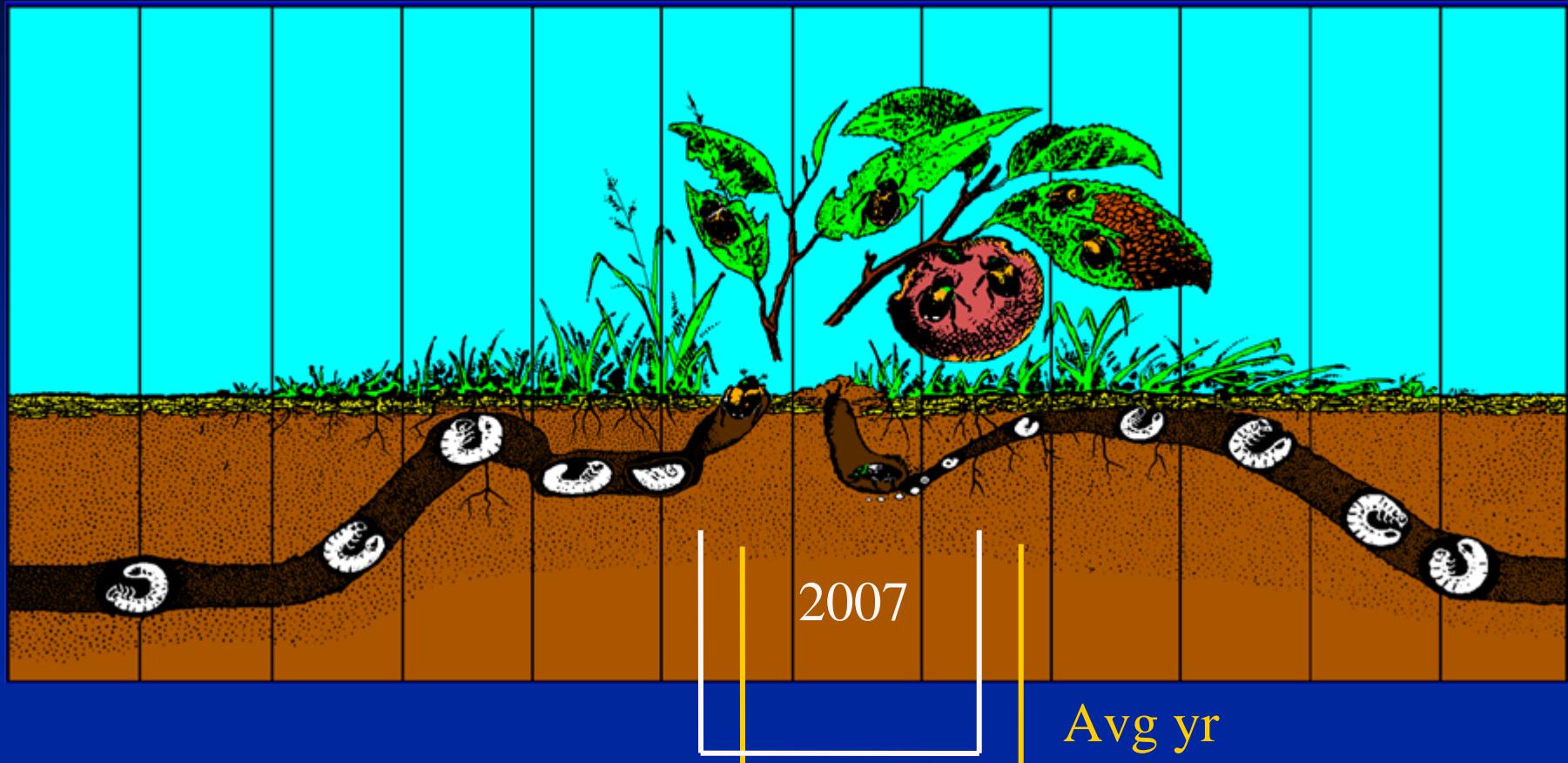
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC



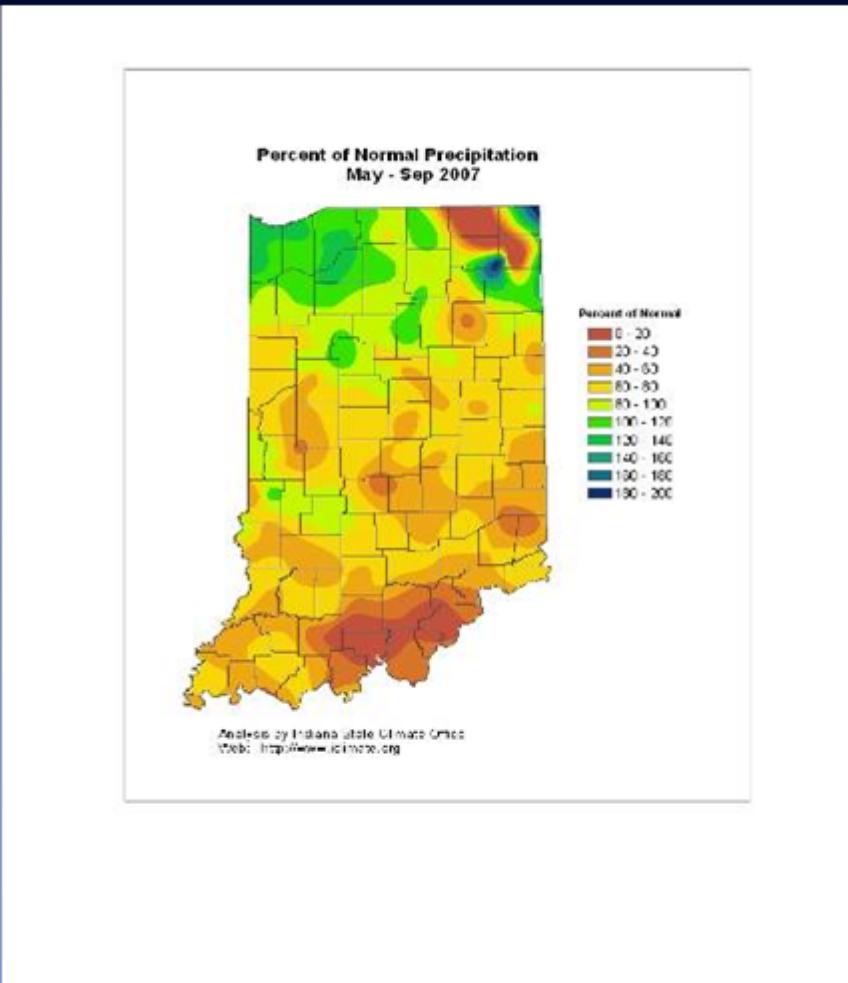
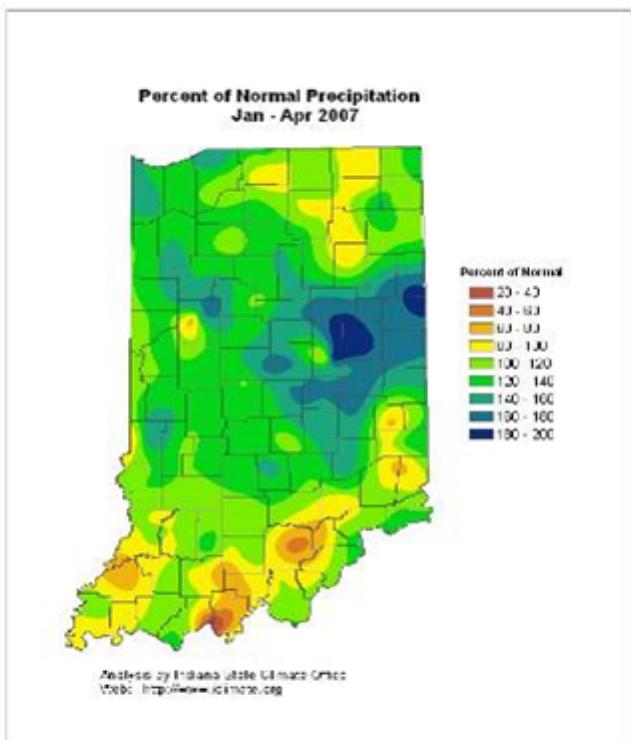
Avg yr

# JB 2007 Adult Activity Period

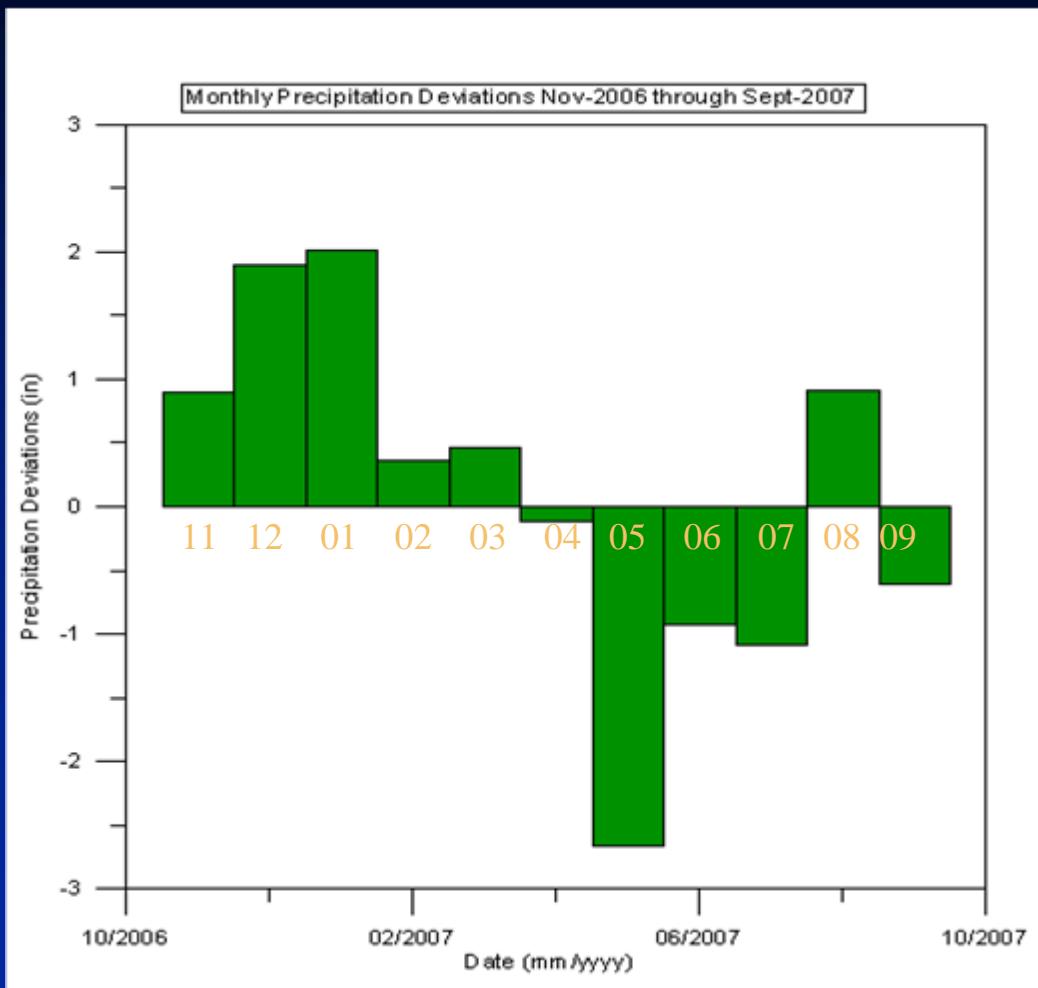
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC



# Precipitation



# Monthly Rainfall Deviations



# Drought Stress



Spruce

Drought affects plants AND animals





Drought: 2007

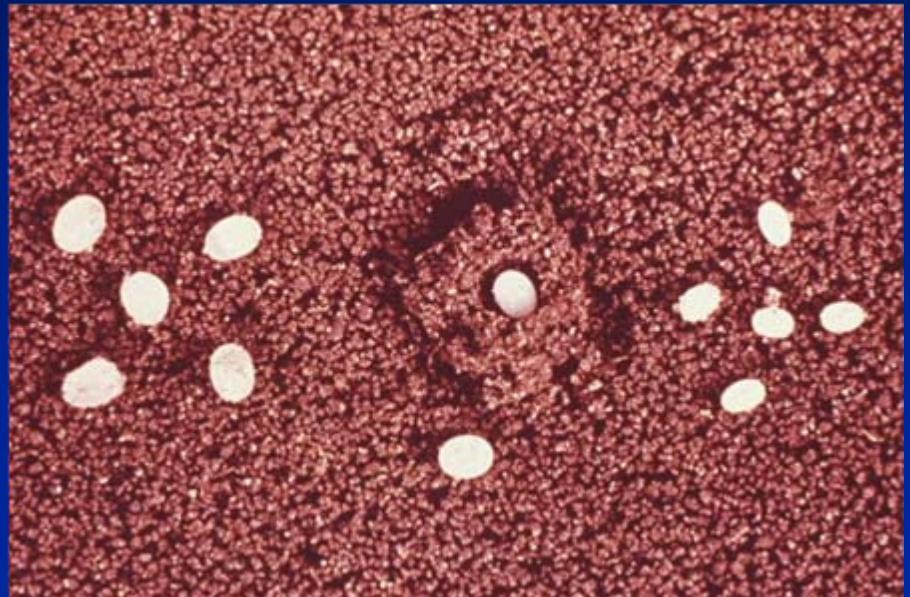
So dry in some areas that  
fire hydrants actually  
welcomed dog visits.

# Effect of moisture on JB survivability - 2008 ????

Eggs and 1st instar larvae desiccate under moisture deficit extremes.

Heterogeneous moisture conditions have been cited as a major cause of spatial and temporal fluctuations in JB populations..

Villani 1999





Effects of 07 drought --- 2008

# Japanese beetle feeding



Phenological indicator plant

Environmental  
effects



on behavior  
And activity

# Understanding: ..... Predicting

Year to year population fluctuations

Seasonal population development

Daily activity fluctuations

(effects of wind, temperature, cloud cover)

Population hot spots

# Understanding: ..... Behavior

Dispersal cues (thoracic temp>27C)

Flight distance and patterns

(5K sustained -1000 meters / hr)

(500 meters to traps)

Movement:

flight is photophyllic and crawling is thigmotactic

# Understanding: ..... Behavior

12 - 5 PM = highest activity times

Attracted to plants silhouette  
(trees/planes?)

regardless of feeding suitability

More attracted to ‘damaged’ plants

Activity (flight) depressed = non peak  
times, overcast, windy, rainy, cold

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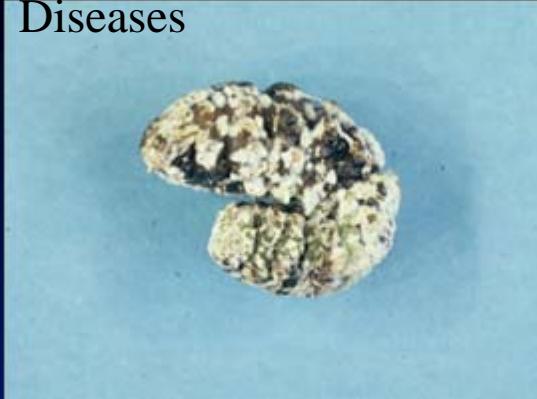
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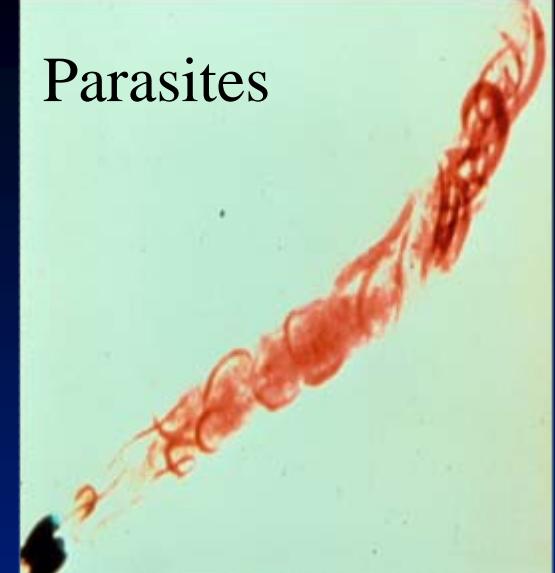


IPM:  
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Diseases

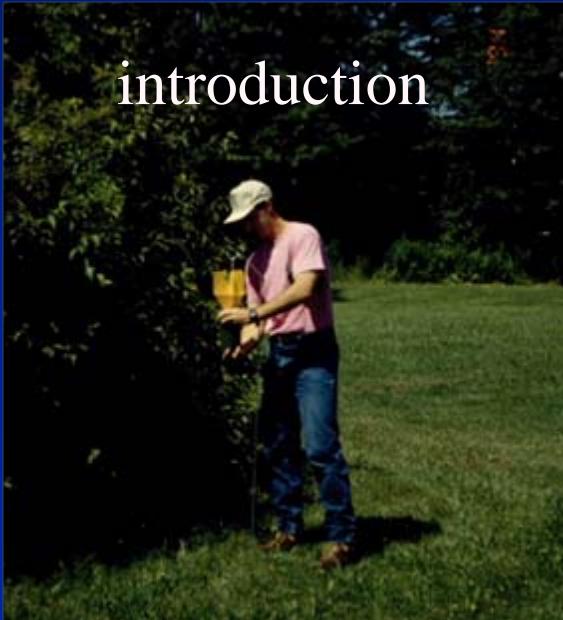


Parasites



# Natural enemies

introduction



conservation



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# Tempo SC Ultra



# Grub sampling



and ID to determine  
need for grub control

# **Grub Control - Chemical Update - #9**

**Merit:** Imidacloprid - owns majority of market - new labels

**Meridian:** Thiamethoxam - long awaited label in turfgrass

**Mach2:** Halofenozide - growth regulator - preventative

**Dylox:** Trichlorfon - curative grub control - penetrates thatch

**Sevin:** Carbaryl - curative grub control - common

**Arena:** Clothianidin - new neonicotinoid product - also controls surface feeders

**Allectus:** new Bayer product = 2% imidachloprid + .16% bifenthrin

**Aloft:** new Arysta product = .25% clothianidin + .12% bifenthrin

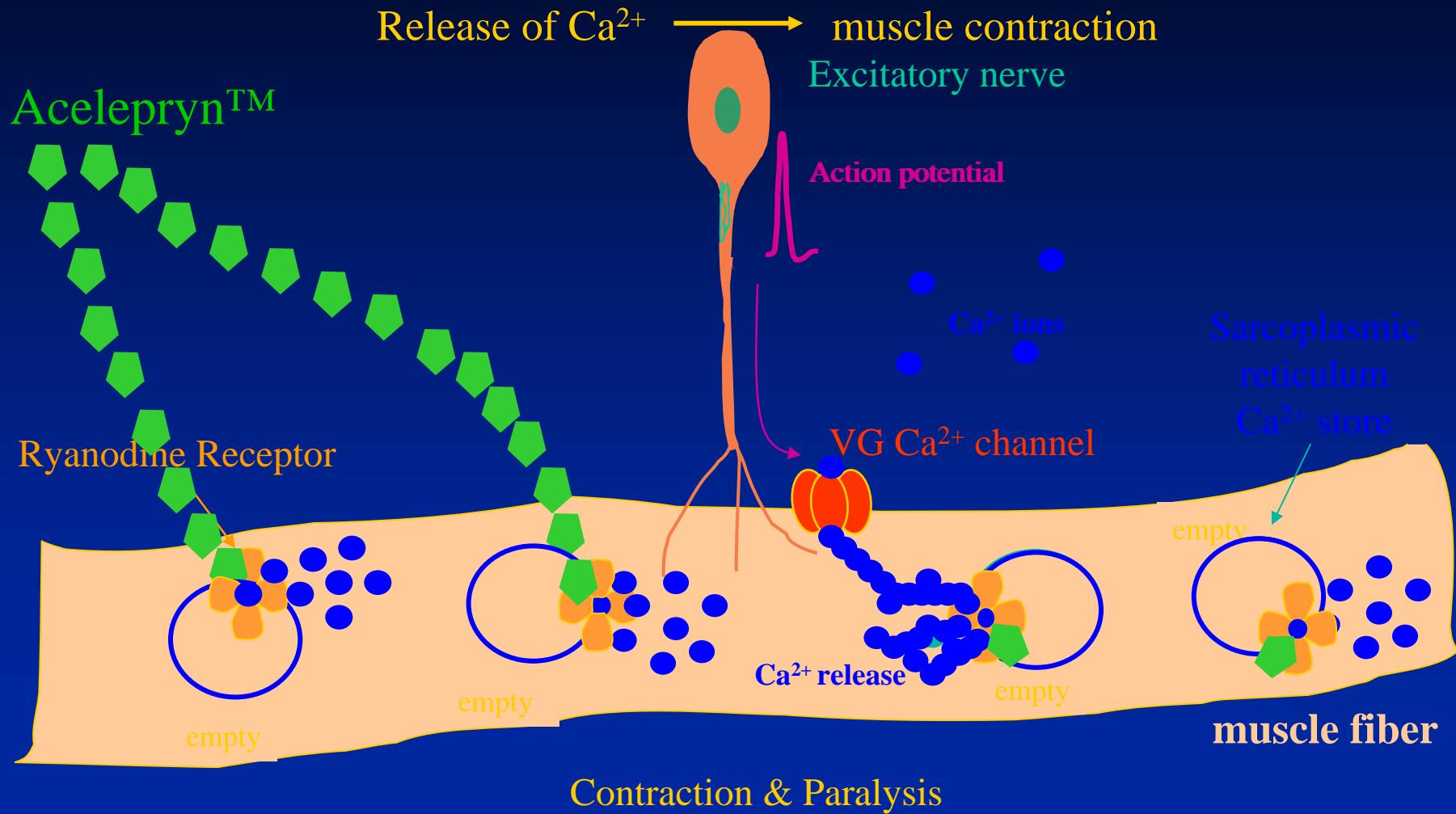
New product - Dupont - Acelepryn

# Acelepryn<sup>TM</sup>

- ◆ New class of chemistry – Anthranilic Diamide
- ◆ Novel mode of action
  - ◆ Activates the ryanodine receptor, which depletes Ca<sup>+</sup> from insect muscles
- ◆ Systemic activity
- ◆ Excellent white grub activity
- ◆ Controls other key turf and ornamental pests
- ◆ Sprayable and granular formulations
- ◆ Extremely low mammalian toxicity
- ◆ Extremely low fish and bird toxicity
- ◆ Virtually non-toxic to honey bees

# Acelepryn™ Mode of Action

Action potential triggers brief Ryanodine Receptor openings



# Acelepryn™ Turf Spectrum of Activity

## White Grubs

European Chafer

Japanese Beetle

Northern Masked Chafer

Oriental Beetle

Southern Masked Chafer

Asiatic Garden Beetle

Black Turfgrass Ataenius

Green June Beetle

May/June Beetles

*Aphodius* spp.

## Other Turf Pests

Annual Bluegrass Weevil

Bluegrass Billbug

European Crane Fly

Chinch Bug (Suppression)

Armyworms

Black Cutworm

Sod Webworms

# Acelepryn™ Registration Status

- ◆ EPA registration packages submitted in January 2007
- ◆ End-use formulations include:
  - ◆ Acelepryn SC
  - ◆ Acelepryn Granular
  - ◆ Acelepryn Granular Fertilizer
- ◆ Expect EPA approval in March/April 2008
- ◆ Granted EPA Reduced Risk Status on turf 03 April 2007

# Purdue Grub Insecticide Testing

<u>Pesticide:</u>	<u>expected control: (%)</u>
Merit (Imidachloprid)	95
Meridian (Thiamethoxam)	94
Mach2 (Halofenozide)	89
Dylox (Trichlorfon)	77
Sevin (Carbaryl)	70
Arena (Chlothianidin)	95
Allectus (Merit + Bifenthrin)	90
Aloft (Arena + Bifenthrin)	96
Acelepryn (Anthranilic Diamide)	95

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Distribution and Dynamics of Japanese Beetles Along the Indianapolis Airport Perimeter and the Influence of Land Use on Trap Catch. Population Ecology - Environmental Entomology - ESA. 2007

Bottom line is that changing land use (agronomic field crops) patterns can affect JB population densities

# Cropping Practices



# Host Plant Reduction







APPRENTICE AND JUNIOR  
TRAINING CEN

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# JB Best Management Practices at FedEX Indianapolis



T. J. Gibb and Jim Carroll

# Success in 2007

- 99.63% of beetles seen = excluded
- only 1 w/ >1 live beetle found / 360 regulated flights

*Success is predicated upon the following  
'best management practices'*

Carrier commitment: annual basis

demanding - resources - time  
major financial investment  
management buy-in

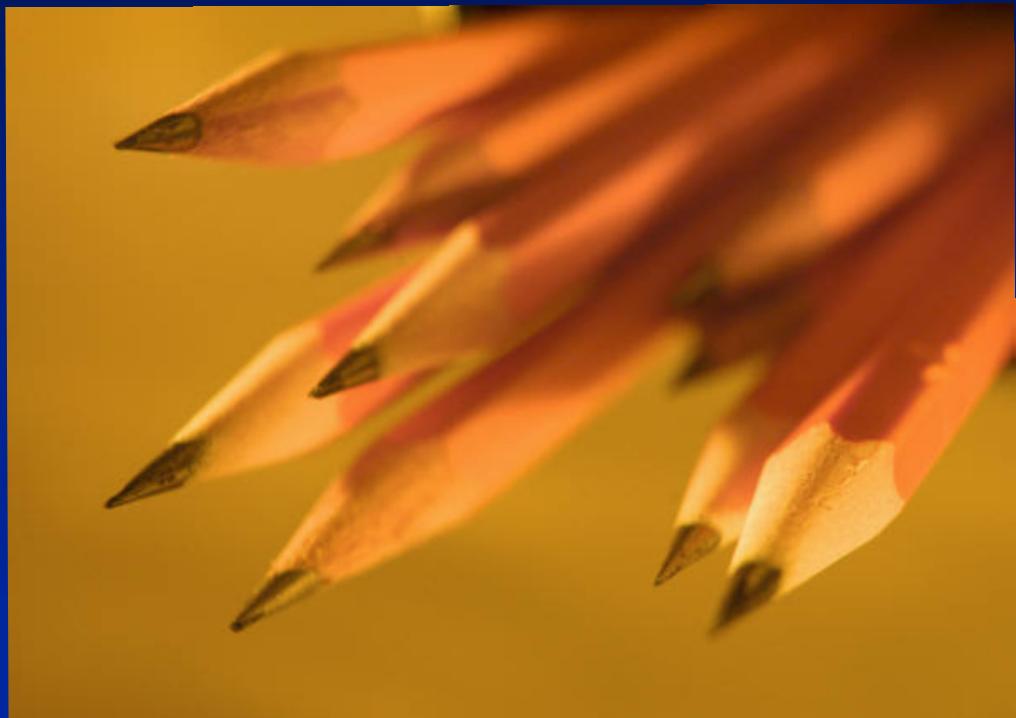
Constraints:

unpredictable nature of JB - every year is different  
changes - management other personnel  
USDA regulation updates  
changes in equipment excluders

? ?

# Planning

- Advance planning - > 3 month adult activity season
- Personnel
- Equipment
- Projects
- Chemical
- Training



# Hiring of personnel:

- 2007 = >100 employees dedicated to beetle management.
- Assignment of personnel - turnover and loss of

Other assignment issues:

Working relationships

- matching personalities

(Entomophobia)

(Chemophobia)

(Sweatophobia)



# Training:

## Significant

- Classroom vrs OTJ - flexibility required depending on yr.
- Personnel
  - SIT Teams
  - SWAT Teams
  - Team Leads
  - Baggers
- Ramp Managers (awareness of requirements EAN)
- Loading Crew personnel (use of excluders & other procedures)
- Management

# Inspection











AMJ 41250 FX

AMJ 47736 FX

31332

FedEx

TW 2120





AMJ 40236 FX

FedEx

5



# Spray team training:



Temp SC ultra  
efficacy  
- rates, application, etc

Safety



# Personnel attention/focus

- Maintaining vigilance in slow times  
Responsibilities / ownership

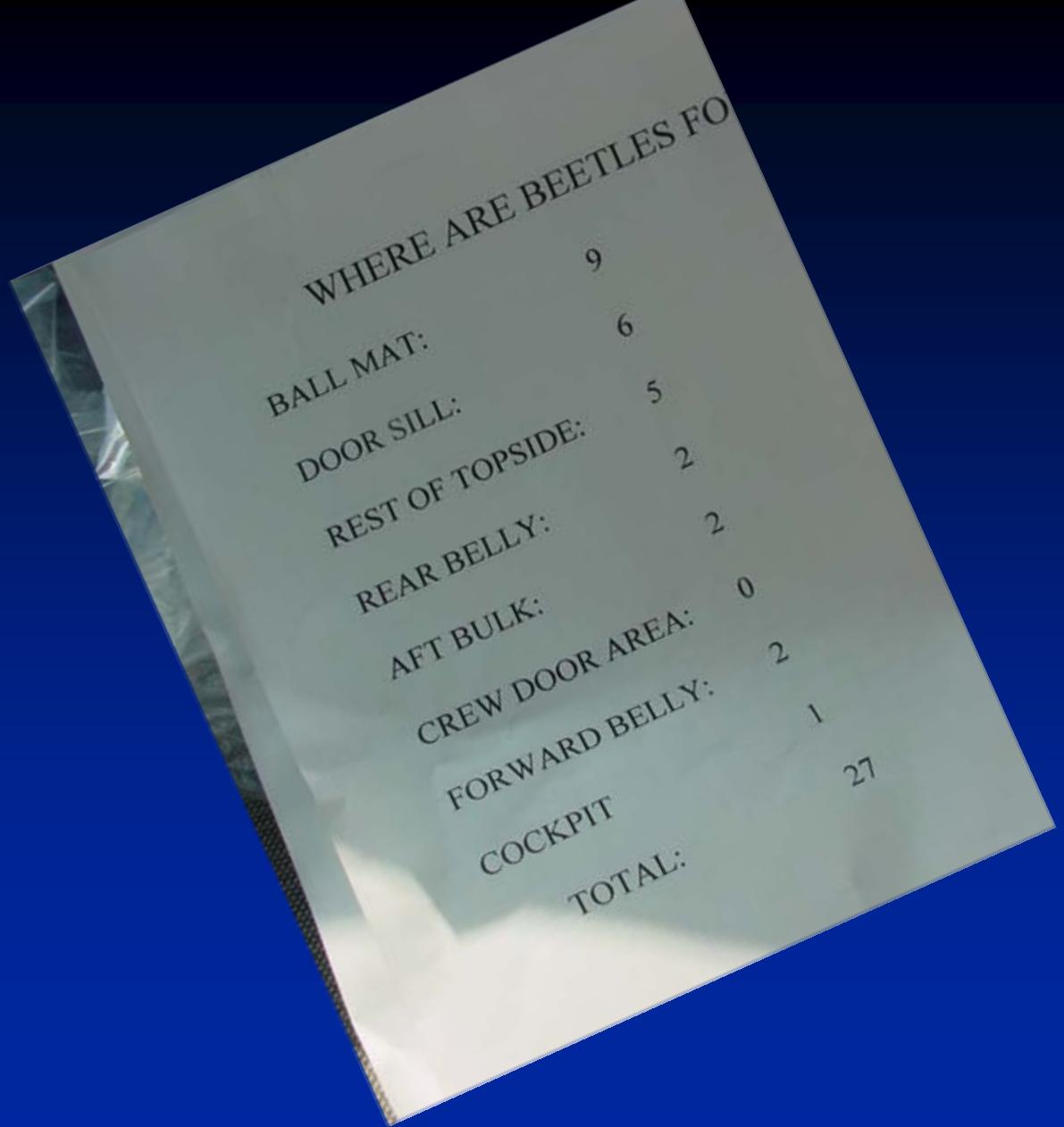


Statistics - comparisons  
15-minute walk-arounds  
Meetings - face time

On site leadership

Awards - encouragement (Prize beans)  
On task vs reassessments

# Record keeping



# Equipment procurement and maintenance:

- Excluders:

- # of excluders - mounted - timeliness

- Maintenance / design improvements

- SAFETY HAZARDS

- aircraft strikes

- Operator certification

- Impaired visibility for  
loading crews



# Equipment procurement and maintenance:

- Other equipment

Availability

Security / safety

Maintenance



# Flexibility and local control:

timeliness  
authority

ie. parking aircraft in low risk gates  
bagging, extra inspectors, swat teams,  
tail swaps, delays, etc

# Can monitoring and control: risk of entry - trojan horse

- Importance of flexibility and local control
- Splitting demi's to better inspect
- Plastic bag fit concerns
- 450 beetles killed on cans in 2007
- 2008 modifications

# Non-regulated flights

- Why an issue ? 16 btls in 2006 vs 3 in 2007
- VOLUNTARY tracking and safeguarding/spraying
- -158 non-reg flights treated/guarded

# Blitzing aircraft

(tracking of EVERY Indy aircraft in daylight hrs)

- when and why
- how it helps



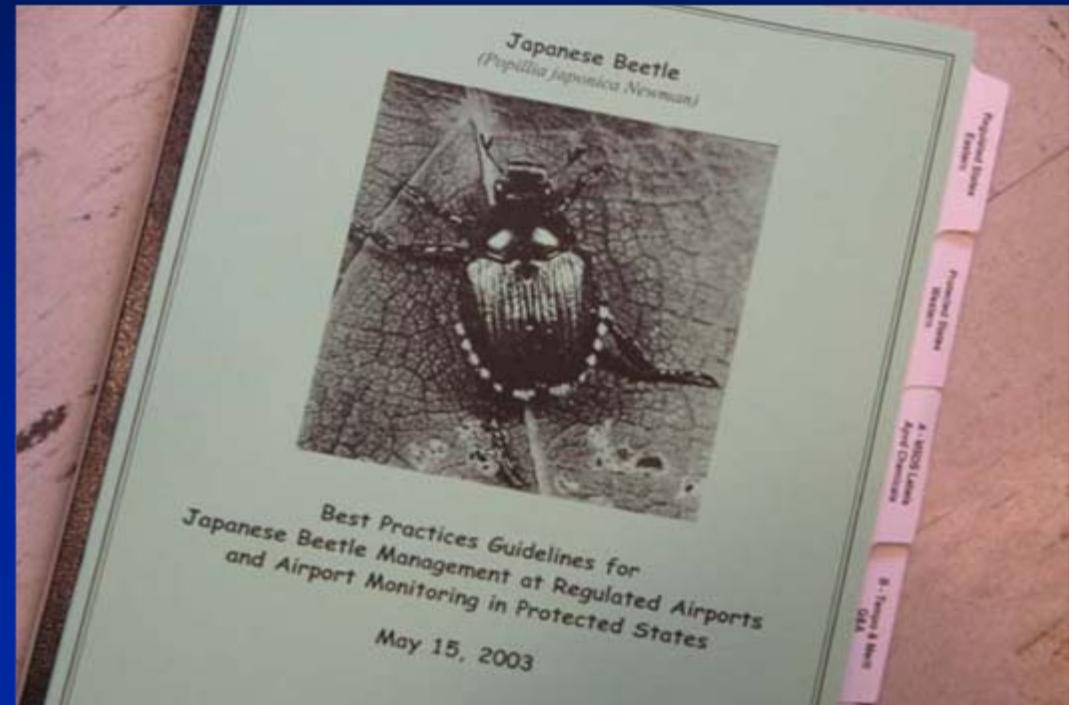
# Security constraints:

- Post 911 fallout
- Ramp access/ security clearance
- USDA and consultant mobility
- Restrictive on-site experimentations and monitoring



# Cooperation from protected states

- Accurate categorization of beetles
- Quick feedback, esp w/ live finds
- Identify flights  
of concern
- Location, #,  
category = essential



# Potential program problems in 2008:

- Management change
- Philosophy / cooperation
- Facility expansion
- Beetle unpredictability

