Integrated Pest Management

APPA Institute
Ft. Worth, TX
1/9/23

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University of Colorado **Boulder**

Housekeeping

- In the right room?
- Welcome and Thank you!
- Attendance list
- Break
- Session Evaluations
  - Please add written comments
    - Did the course offer a good balance between concepts and examples?
    - If not, what would you like to see more of?
    - Other suggestions?

Credit(s) earned on completion of this course will be reported to American Institute of Architects (AIA) Continuing Education Session (CES) for AIA members.

Certificates of Completion for both AIA members and non-AIA members are available upon request.

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

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Course Description

Is your campus dealing with challenging pests like bed bugs or pigeons? Is your campus interested in reducing pesticide use due to health and safety concerns? Are you looking for safe, cost-effective, and long-term solutions to perennial issues? Join us for an in depth yet fun look into the evolving world of Integrated Pest and Wildlife Management. This session will explore the role of your departments' maintenance staff, the use of thermal remediation for structural pests, wildlife management, and IPM in Grounds. The program will also cover emerging topics such as pollinator protection and environmentally sensitive mosquito control programs. Join this engaging class and learn how to "treat the source, not the symptom."

AIA Continuing Education Provider

Learning Objectives

1. Identify and explore the principles and benefits of environmentally friendly pest control, or Integrated Pest Management (IPM).
2. Review the hazards and consequences of (improper) pesticide use.
3. Explore the role of Facilities Maintenance in campus pest control.
4. Learn the current trends and initiatives in integrated mosquito control, IPM in landscaping, wildlife management, and pollinator protection
5. Share practical examples from around the country.

AIA Continuing Education Provider

Personal Introduction

- Dept. of Facilities Management
  - Division of Infrastructure & Sustainability
- Sustainability Program Manager
- Formerly the Assistant Director for Environmental Operations
  - Campus Pest Control Coordinator & Wildlife Manager
- 18 years experience

Course Overview

- Introduction to IPM
- Program Summary
- Role of trades / maintenance staff
- Thermal Remediation
- Mosquito Control
- IPM in Grounds
- Wildlife management
- Pollinator Protection

Pesticides 101

- The term “Pesticide” includes:
  - Insecticide
  - Herbicide
  - Fungicide
  - Larvacide
  - Biocide, etc.

- -cide
  - *combining form*
  - suffix: **-cide**

  1. denoting a person or substance that kills.
  "insecticide"

  2. denoting an act of killing.

  "homicide"

- Pesticides are designed to kill, repel, disrupt.

- Anything used by a licensed pest control professional can be considered a pesticide, including soapy water.

Pesticides:

Why should we be Concerned?

- Pesticides are generally over used
- Pesticides move - N.C State study
- Pesticides should not be considered “safe”
- Pesticide registration process flawed…burden of proof on public
- “Inert” ingredients not biologically inert
- Greater effects on children
- MCS (Multiple Chemical Sensitivity)

Common Effects of Pesticides on Humans

Acute:

- Eye, skin, lung irritant / damage

Chronic:

- Reproductive hazards
- Organ damage
- Carcinogen
- Neurotoxicity
- Mutagen (DNA)
- Endocrine disruptors (hormones)

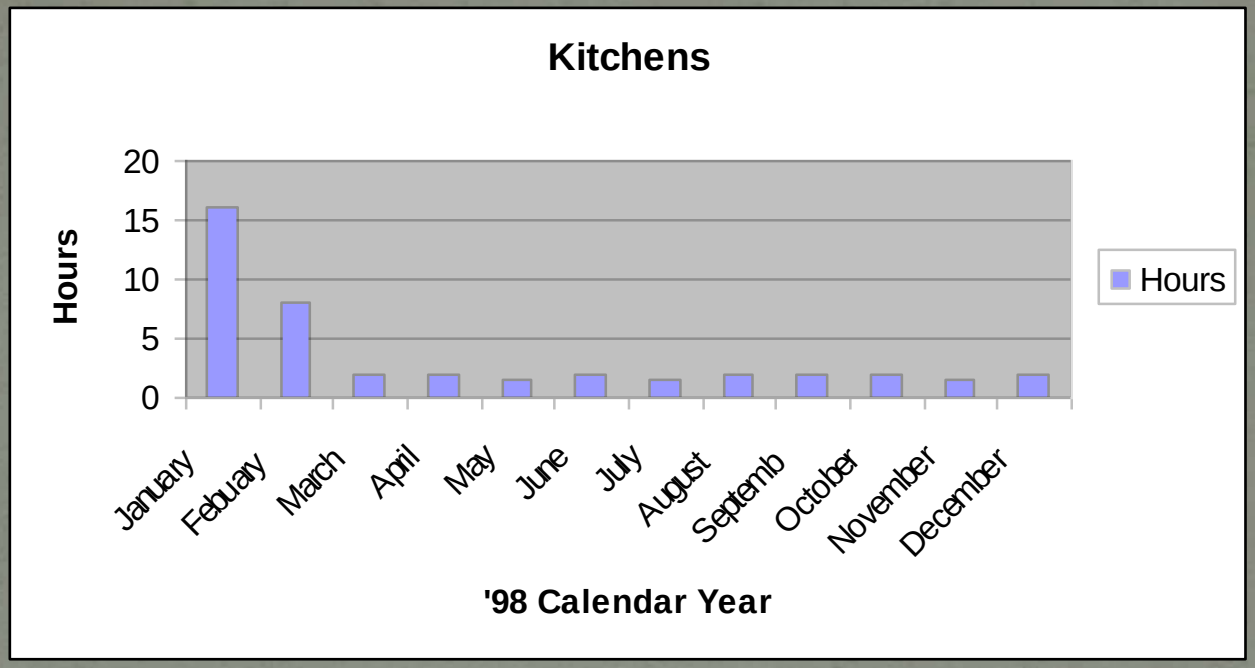
Integrated Pest Management

- Focuses on long term prevention of pests.
- Minimizing the impact on human health and the environment.
  - Use of least toxic controls: Biological, Mechanical, Cultural, and Chemical.
  - Utilizing extensive knowledge about the pests.
  - Monitoring through regular and careful inspections.
  - Record keeping to track and evaluate pest management.
- Most cost effective.

Beyond "Extermination"

- Pest control industry business model dependent on 'call-backs'
  - Move past 'spray & pray' mentality
- Environmental protection
  - Including non-target and beneficial organisms
- Safety – of applicators, campus community, public
  - IAQ
  - Acute exposure
  - Chronic exposure

IPM is Front -Loaded



- Began w/ 4 hrs per WEEK for 6 weeks.
- Reduced to maintenance level of 2.5 hrs per MONTH.
- Control is better than ever.

History at CU Boulder

- Pre 1998:
  - No campus pest control staff, program or policy
  - Pest control conducted by (zone) maintenance staff
  - Departments called private pest control providers
  - 1000's of gallons of liquid pesticides used (indoors) in certain years
  - Little to no IPM

- Since 1998:
  - In-house structural IPM and wildlife management team
  - Campus wide policy (IPM coordinator)
  - All pesticide applications reviewed in advance
  - All applicators licensed by State

Policy Overview

- Policy is campus-wide (3/12/02)
- "Threshold Action Levels" determined

- Based on Threshold Action Levels, select a treatment that is:
  - Least hazardous to human health
  - Least damaging to the environment
  - Effective in controlling the pest
  - Has minimal negative impacts to non-target organisms
  - Within available resources

- All proposed pesticide applications reviewed by coordinator.
- Only "Qualified Supervisors" have authority to purchase pesticides.

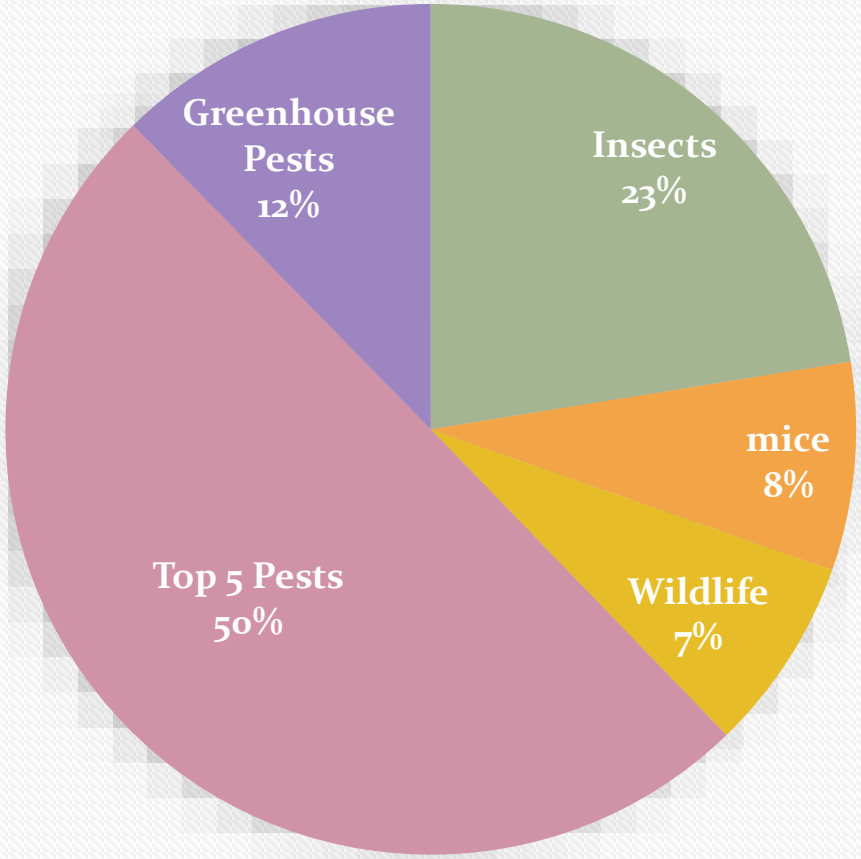
How CU Internalized Program

- Primarily a financial argument
  - Decentralized service using private vendors
  - Compared vendors costs vs. in-house rates
  - Calculated amount of recharge
- Fortunate to have a private technician working on campus and looking to work for campus

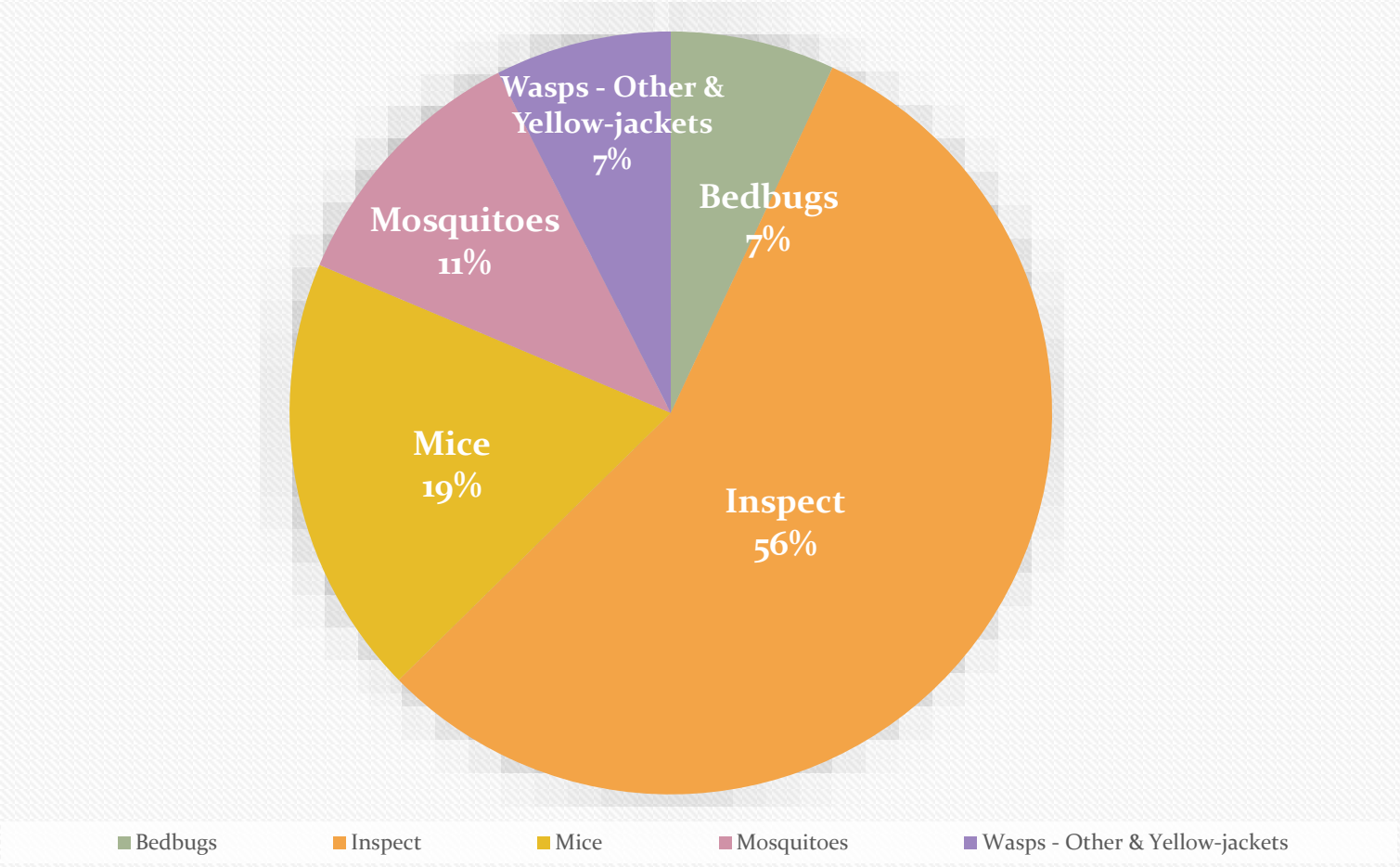
Services provided

- All structural/indoor pests controlled including:
  - Research & Animal Labs
  - Food Service areas
  - Greenhouses
  - Recreational facilities
  - Museums / Collections / Archives
  - Bed and Bat bugs
  - Residential areas
  - Child Care centers
- Outdoor pests:
  - Mosquito control program
  - Yellow Jacket traps (~300 traps every 3 months)
  - Rodent bait stations (~700 stations/month)
- Wildlife management:
  - Bird control
  - Marmots, coyotes, foxes, p-dogs, deer, bears, mtn. lions, sasquatch

CY 2022 Total Labor Breakdown by Hours



Top 5 Pests - CY 2022 Hours - Consolidated



Non-Chemical Controls at CU

- Parasitic wasps released in steam tunnels to combat cockroaches.
- Use of bio-controls in greenhouses.
- Vacuum, hair dryer, CO_2, hand tools.
- Thermal remediation for the control of structural pests


Trapper
Trapper

Current Resources

- Campus IPM Coordinator (.17 FTE)
- IPM Manager (1.0 FTE)
- IPM Technicians (3.0 FTE)
- 2-3 students (.68 FTE)
  - Depends on season
- IPM Structural Trades Apprentice (1.0 FTE)
  - Currently on hold

Responsible for more than 13 million sq. ft. throughout roughly 370 structures across >1000 acres

Rely on most trades to assist IPM in excluding pests and eliminating attractions

Defensible Space

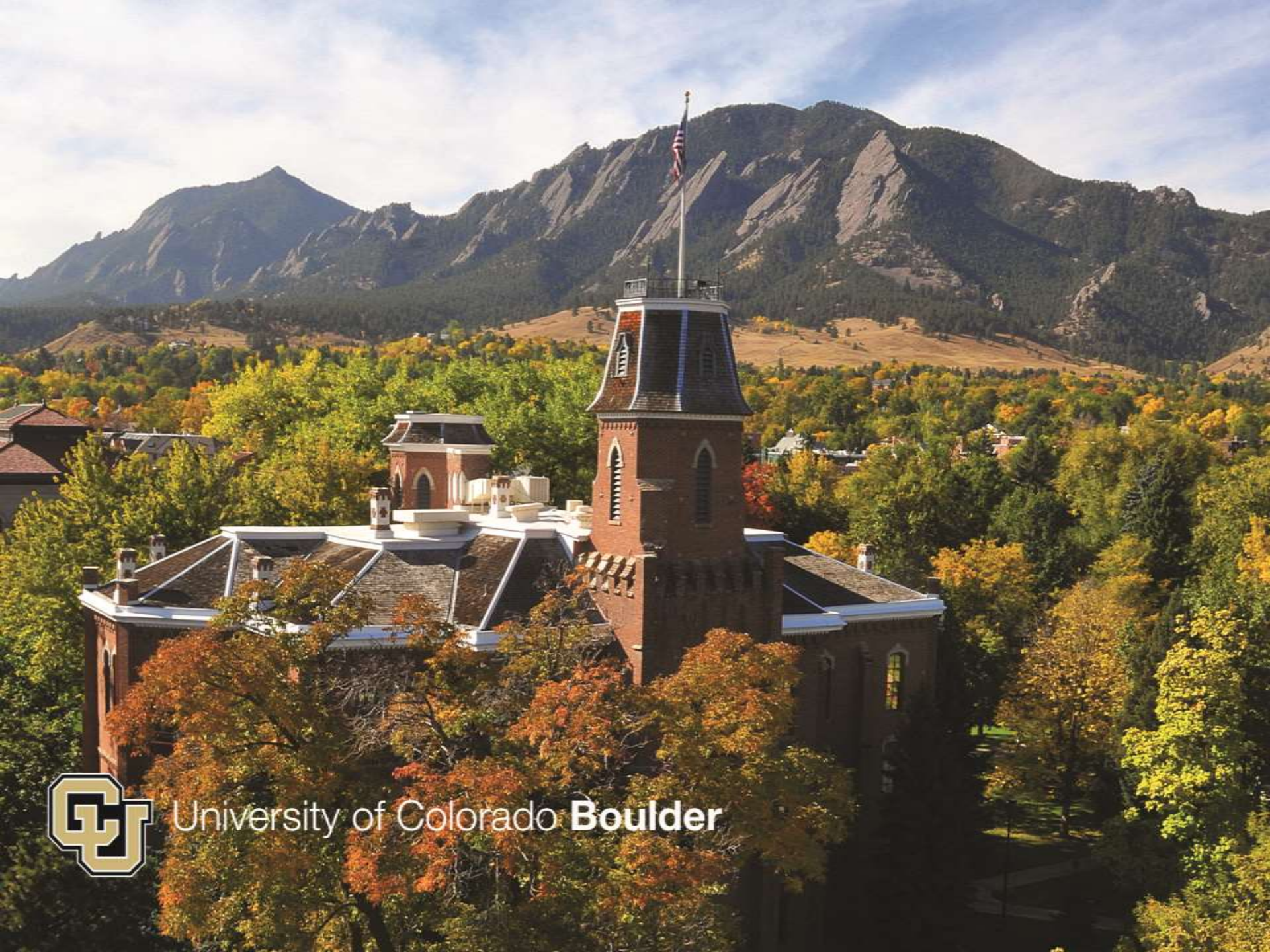
- Exclusion is key to controlling the indoor environment
  - Door sweeps
  - Screens
  - Caulking & sealing
  - Bldg. envelope
    - Old / broken windows
    - Roof / sophet
- Pest control maintenance often overlaps w/ Energy Conservation initiatives

Recent Collaborations

Trades

• Carpenters	Bats & Bees - caulking, sophet repairs
• Fabricators	Bird exclusion – sheet metal work
• HVAC	Henderson Museum – moisture issues
• Elevators	elevator shaft maintenance & drainage
• Structural	bldg. envelope, windows, screens
• Roofers	gutters, roof tiles, Cupalo exclusion

Access to restricted spaces such as mechanical rooms, roofs, and elevator shafts is invaluable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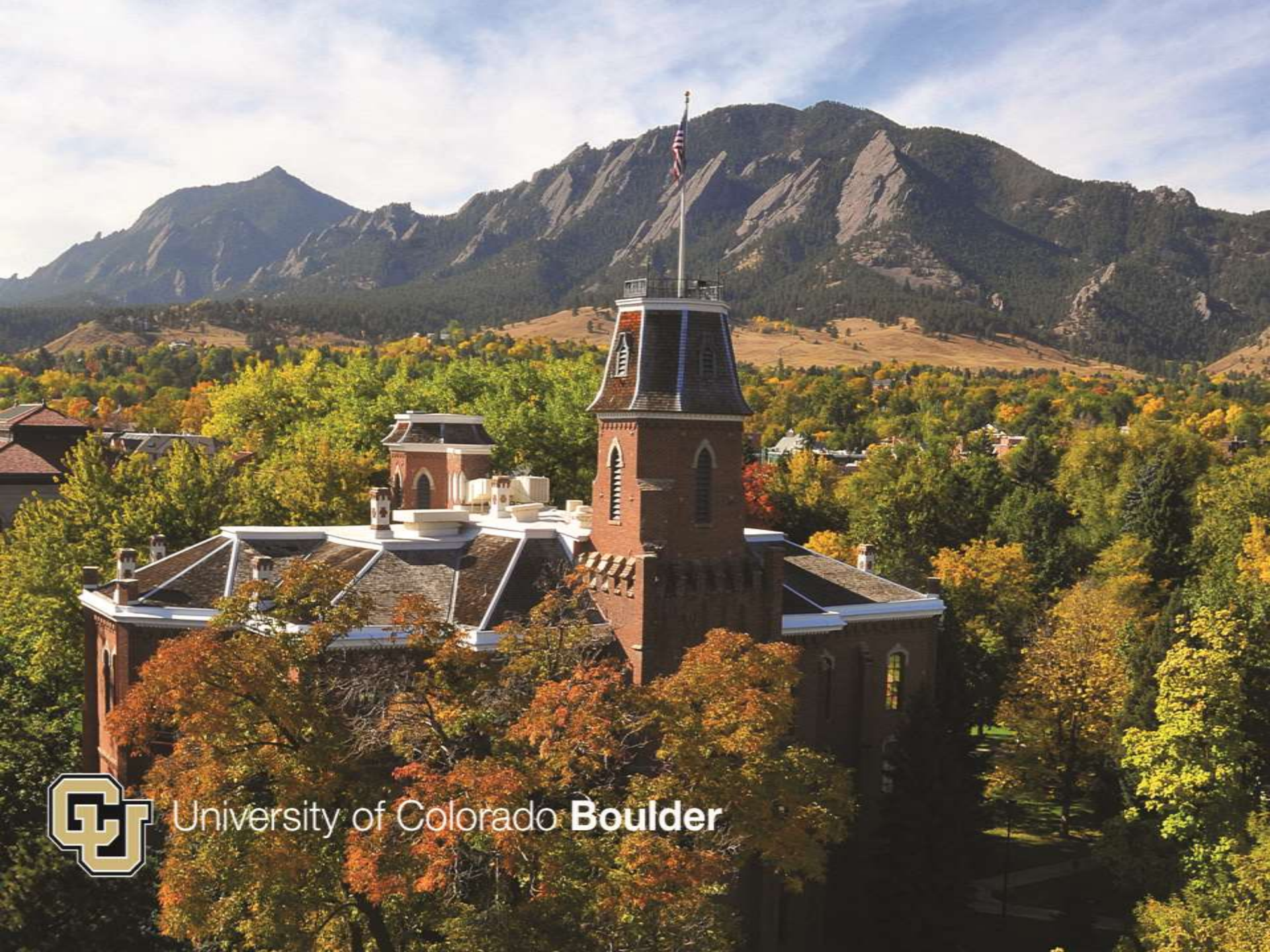
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Indoor* Chemical Use CY 2005-2006

*(not including greenhouses)

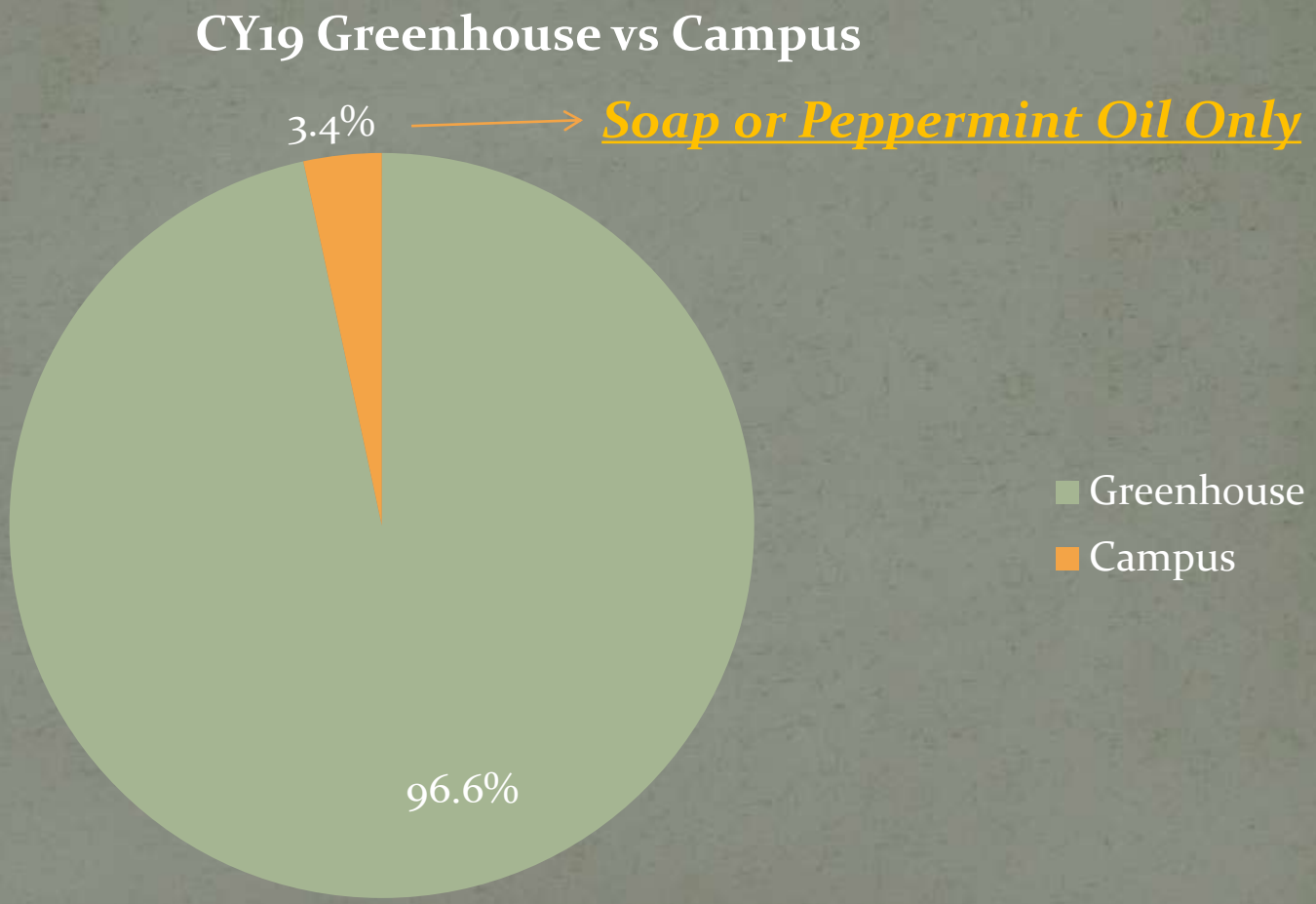
CY2005

- Total of 3898 grams of solids.
  - 8.54 lbs. of solid pesticides used in roughly 8 million square feet.
- 519 ounces of liquid/aerosol spray applied.

CY2006

- Total of 2725 grams of solids.
  - 5.96 lbs. of solid pesticides used in roughly 8 million square feet.
- 699 ounces of liquid/aerosols spray applied

Exposure to Sprays Minimized



Thermal Remediation

CONTROL METHOD SUMMARY

Control Method	Description	Control Method Benefits					
		Controls adults	Controls nymphs	Controls eggs	Area-wide Treatment	Local Treatment	Treats inaccessible areas
Vacuum Cleaner	Use conventional vacuum cleaner to remove bed bugs	x	x			x	
Steam Cleaner	Use steam cleaner to heat and kill bed bugs	x	x	x		x	
Chemical Pesticide - Aerosol	Mixed liquid pesticide applied to kill bed bugs	x	x			x	
Chemical Pesticide - Dust	Powdered pesticide applied to kill bed bugs	x	x			x	x
Thermal Pest Remediation	Area-wide treatment to heat and kill bed bugs	x	x	x	x	x	x

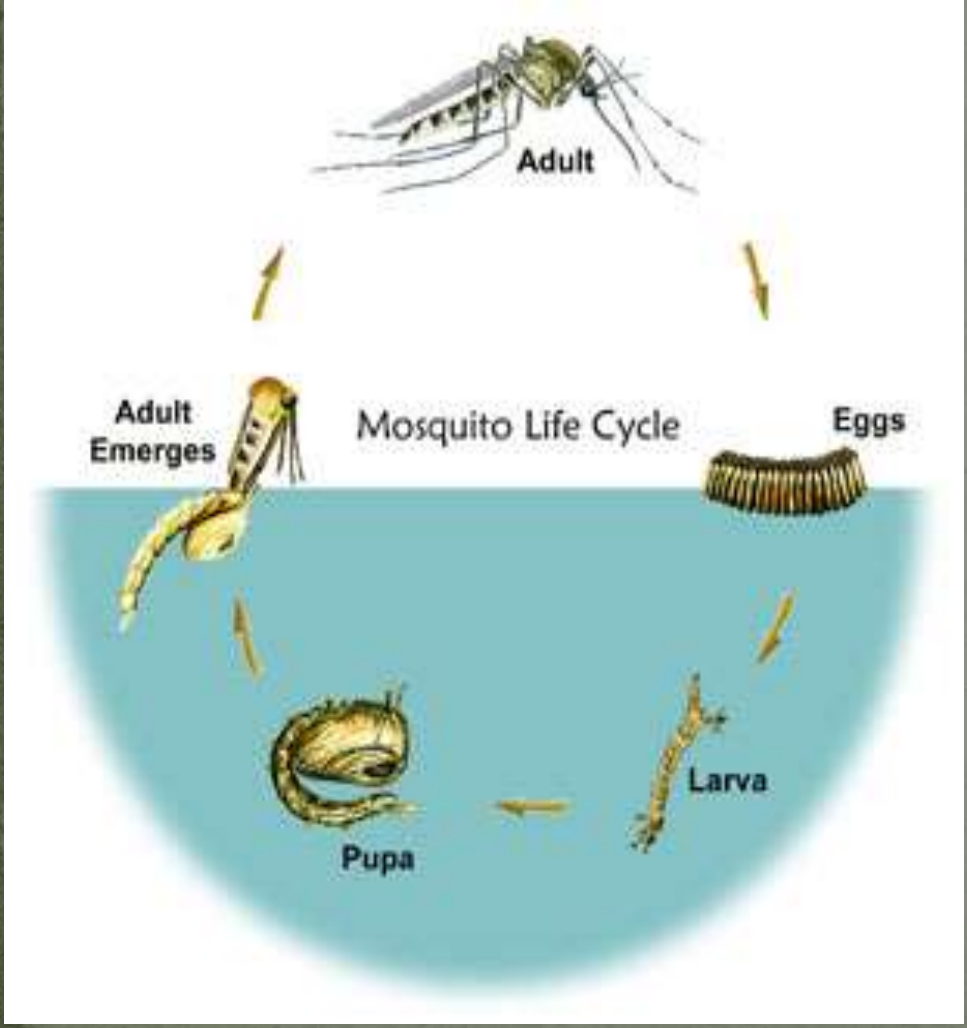
Benefits of Thermal Remediation

- Kills all life cycles, including eggs
- Scalable
- Far reaching
- Less disruptive
- No toxic residues
- Safest approach
- One time treatment (most cases)
  - Certain structures tricky
  - Re-treatments due to unseen cracks, crevices, voids
    - Heat doesn't penetrate down into deep cracks well
  - Tenant compliance becoming more complicated

Mosquito Monitoring & Control

- FTE & student crews trap adults and control larvae
  - Season is roughly 4 months long (June to Oct.)
  - Set 33 traps per week for 4 months – report #'s to County
  - Check roughly 300 potential breeding sites per week – treat as needed
    - Also release minnows
  - No adulticides/fogging needed in 16 yrs of control

Treat The Source



Mosquitoes Grow Quickly

- 11-14 days at 70 degrees
- 7-10 days at 80 degrees
- As few as 4 or 5 days above 90 degrees

Mosquito Control

Integrated Program

Preventive

- Emphasis on reproductive cycle:
  - Adult trapping (33 / week)
  - Larval inspections (300 sites per week)
  - Larvacides – no need to 'fog'
  - Bio-controls (minnows)

Zika Response

Reactive

- Use of adulticides as primary control (least effective)
  - Especially in urban setting
  - Must make direct contact w/ mosquitoes
  - Health impacts of insecticide
  - Extensive non-target impacts…Bees!

IPM in Outdoor services

Developing a Professional Team

- Turfgrass Manager hired - Jan. ’02
- Campus Arborist hired - 2002
- Assistant Turfgrass Manager - Sep. ’03
- Licensed spray technician(s) - Apr. ’05
- Full time mowing crew - May ‘06
- In the field turf technician - Nov. ‘06
- Lead irrigation technician - Nov. ’06
- Grounds reorganized into Outdoor Services - 2009
- Additional turf & tree FTE - 2012

Turf, Trees, Noxious Weeds

- Specialized staff hired over past decade
- Investment in robust irrigation system
- Steady reduction in herbicide use since 2002
- Specialized fertilization program
- Specialized equipment for cultural turf program
- Scheduled tree spraying eliminated
- 1st Integrated Turf Plan - May '02
- Revised Integrated Turf Plan – June '08
- Compost tea system established – 2011

- No Pesticides on campus turf areas since 2012

Compost Tea

Meets longstanding desire to use compost on campus grounds….
that was seen as time & cost prohibitive.


GEOTEA™
Compost Tea Machines
N2210 Brothertown Beach, Chilton, WI 53014
GEOTEA COMPOST
Add entire contents to teabag at
the beginning of the brew cycle.
Volume: 15 quarts (14.2 L)
GREATEREARTHORGANICS.COM

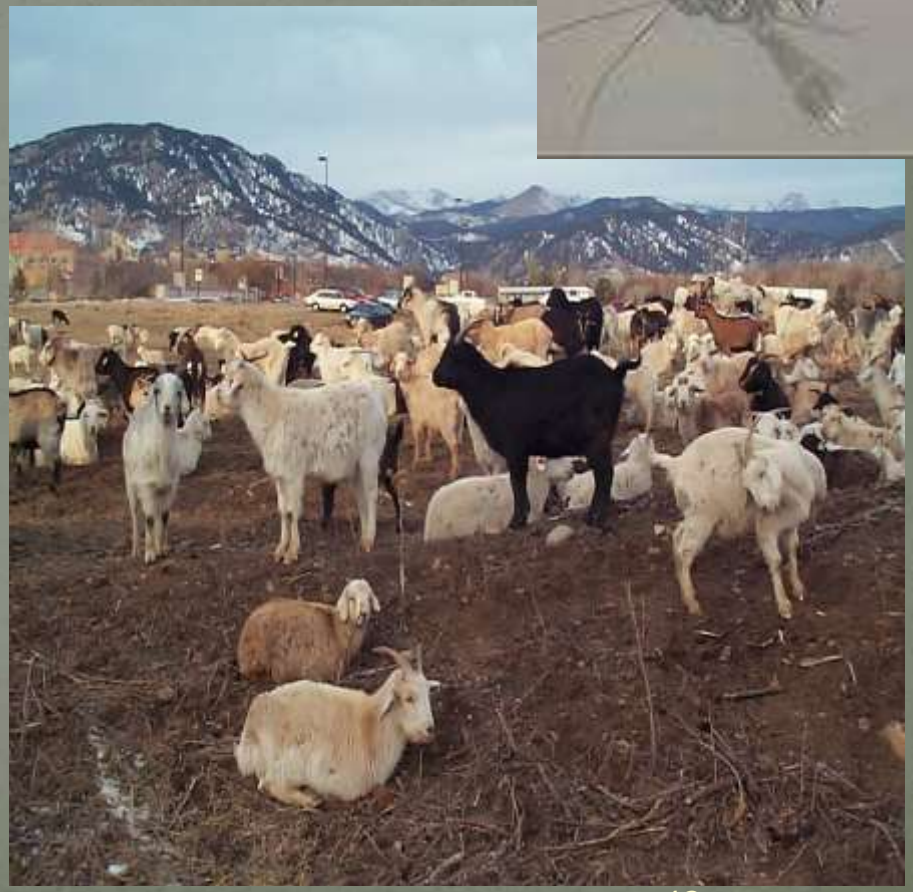

Active
CT

Now covers all areas serviced by ditch water, including Folsom Field.

Non-Chemical Controls at CU

Noxious Weeds:

- Cashmere goats used to graze noxious weeds.
- Use of seed- and root-feeding weevils for knapweed control.
- Considering mites for bindweed



Trees:

- Sanitation pruning of elm trees to discourage elm bark beetles (EBB).
- Non-stinging parasitic wasps for control of Emerald Ash Borer (EAB).
  - Spathius agrili
  - Spathius galinae
  - Oobius agrili
  - Tetrastichus planipennisi

Collaboration over the years…

- 'Beaver Deceivers'
- Herbicide reduction initiatives (turf)
- Reduction in mosquito breeding habitats
- Honey bee relocations
- Tree maintenance program
  - Broadcast sprays predominantly oils
  - Use of soil & trunk injections

Trunk & Soil Injections

Wildlife Management

Research ponds example

- Beavers damming up pond connectors
- Flooding adjacent areas
- Mature trees lost
- Repeated relocations
- Costly

Solution / Results

- 'Beaver Deceivers' installed
- Water level stabilized
- Mature trees wrapped and protected
- Relocation unnecessary
- Resource limits regulate population

Moose Crossing


D R A D O


Attack IR
8/11/2012 12:12 AM
Cuddeback Digital


Saline
Solution

BIO-CONTROLS

Bird Control

- Netting
- Fabrication (metal)
  - Cupolas
  - Score boards
- Shock track
- Bird slide™

- Spikes rarely used

Pollinator Protection

Structural removal


HC - SAFETY ACCESS
NO PARKING

Colony removal


TADDIKEN
303.554.7035

Keys to Success

- Patience
- Extensive research
  - Colony size / health
  - Pesticide impacts to bees
  - Tree health
    - Cavity size
    - Level of infestation
- Coordination w/ contractor
  - Upfront language?

Professor Danielle Bilot

Pollinator Takeaways

- Proper identification
- Not all bees are the same
  - Many different varieties
  - Most natives do not produce honey
  - Natives have different habitat requirements
- Leads to different approaches in different landscapes
- Use pollinator protection to help guide pesticide reduction strategies

Final Takeaways

- Preventive vs. Reactive
- Problem solving
  - I.D. the pest
  - Think like the pest ☺
- Exclusion – defensible space
- Baits & sticky traps

- "Treat the source, not the symptom"

Thank you!

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This concludes The American Institute of Architects Continuing Education Systems Course

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