



Integrated Pest Management

And the ecology that makes it necessary

Joellen Lampman, School and Turfgrass
IPM Extension Support Specialist



About me

- Life-long environmental educator
- Garden dabbler and lawn minimalist



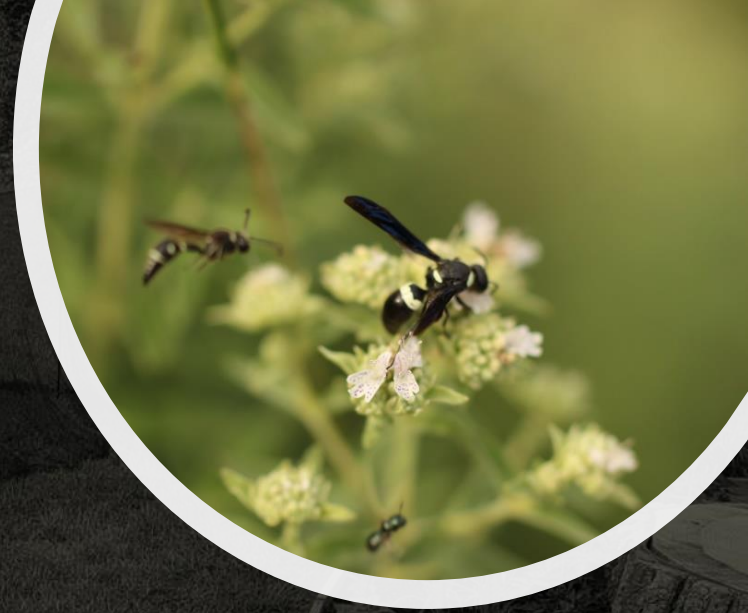
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- Prefer set-it-and-forget-it methods – I'd rather be fishing!



About me

- Life-long environmental educator
- Garden dabbler and lawn minimalist
- Prefer set-it-and-forget-it methods – I'd rather be fishing!
- Love mountain mint



About where I work

New York State IPM
Program Mission:

“We develop and deliver sustainable ways to manage pests that are cost-effective and pose minimal risks to human health and the environment.”



About where I work

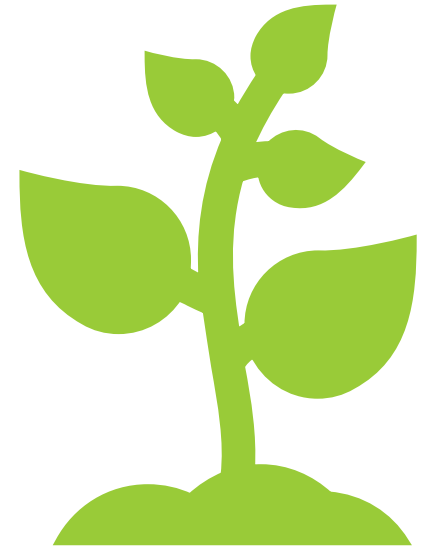
New York State IPM Program Areas:

- Fruit
- Vegetables
- Livestock
- Field Crops
- Ornamentals & Greenhouse
- Community



About you – use the chat box

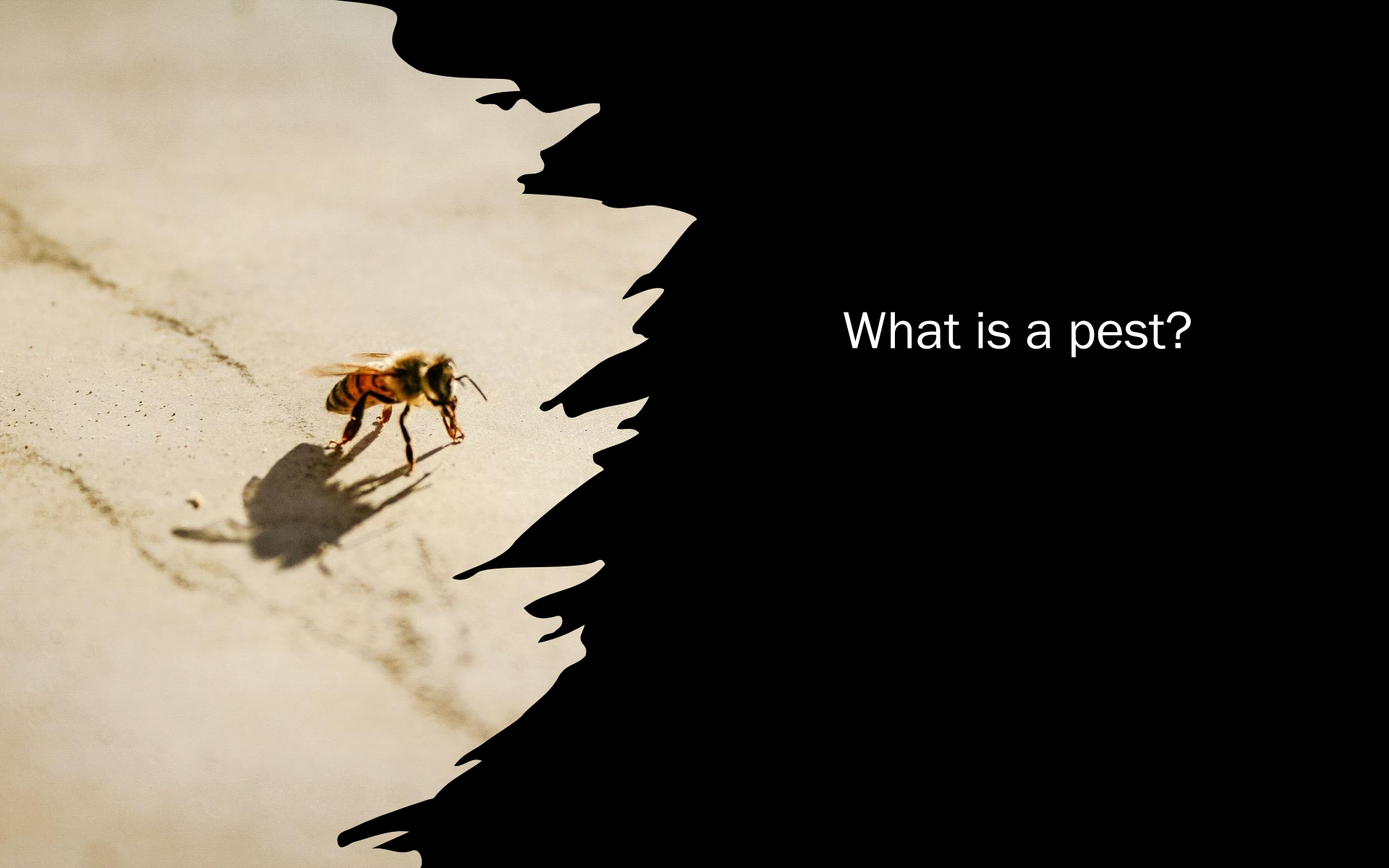
- What is your favorite Master Gardener Program activity?
- What's your favorite garden plant?





IPM

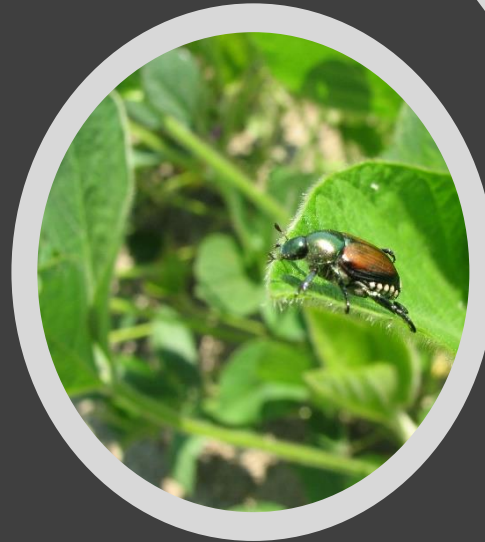
Integrated PEST Management



What is a pest?

WHAT IS A PEST?

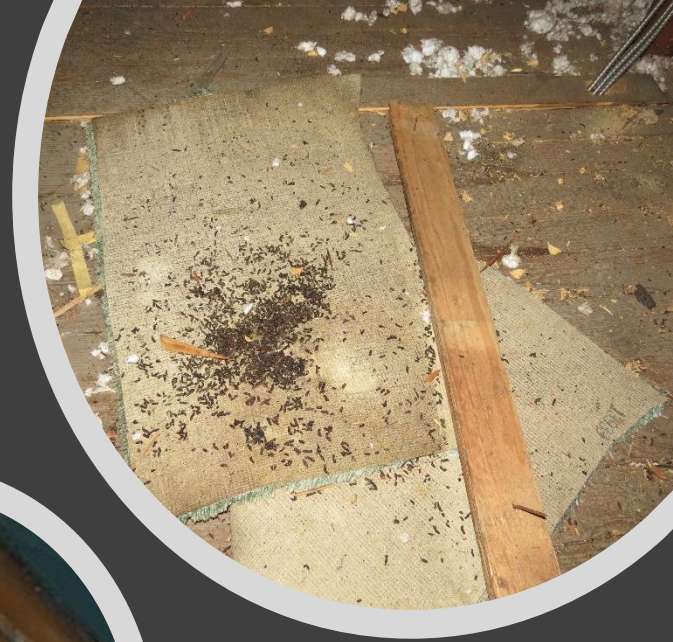
- Living organism



Chris Isherwood, flickr

WHAT IS A PEST?

- Living organism
- Not what it is; but what it does:
 - Property damage



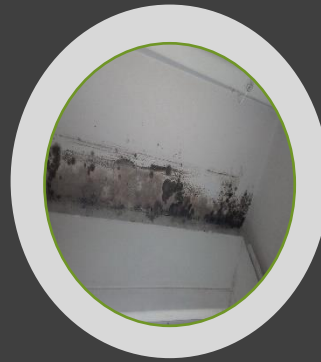
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WHAT IS A PEST?

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 - Property damage
 - Eats and/or contaminates our food
 - Health risks



Chris Isherwood, flickr



WHAT IS A PEST?

- Living organism
- Not what it is; but what it does:
 - Property damage
 - Eats and/or contaminates our food
 - Health risks
 - Detracts from our aesthetics & comfort
 - Provides habitat for other pests



Pest?



Wildlife Terry, flickr



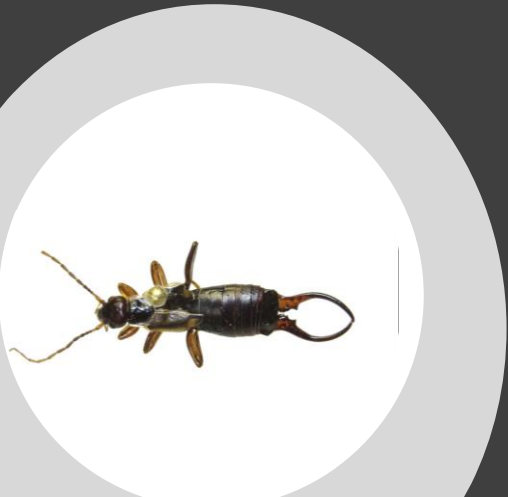
How about now?

Pest?





Pests?



I Found Pests! What do I do?

- I Found Weeds!
- I Found Aphids!
- I Found Stink Bugs!
- I Found Deer Damage!
- Chipmunks!
- Mosquitoes!
- Ticks!
- Woodchucks!
- Spiders!
- Grubs!
- Ants
- Canada Geese
- Moles
- Moss
- Rabbits
- Raccoons
- Squirrels
- Starlings
- Sting Nematodes
- Voles
- Spiders
- Algae
- Bedbugs
- Bats
- Snakes
- Centipedes
- Crickets
- Yellowjackets
- Termites
- Cockroaches
- Scarab Beetles
- Millepedes
- Sow Bugs
- Earwigs
- Silverfish





I found a
bug!

I found a bug! What do I do?



**KEEP
CALM
AND
IPM**

I Found Pests! What do I do?

- Integrated Pest Management Overview
- Ecology 101
- Pest Management



"Hello, Master Gardener Hotline...?"

Your turn– use the chat box

- What does IPM mean to you?
- Let us know if you have never heard of it before.



Integrated Pest Management

- Goal: manage pests while minimizing the human health, environmental, and economic risks of pests and pest management.



Photo USDA, flickr

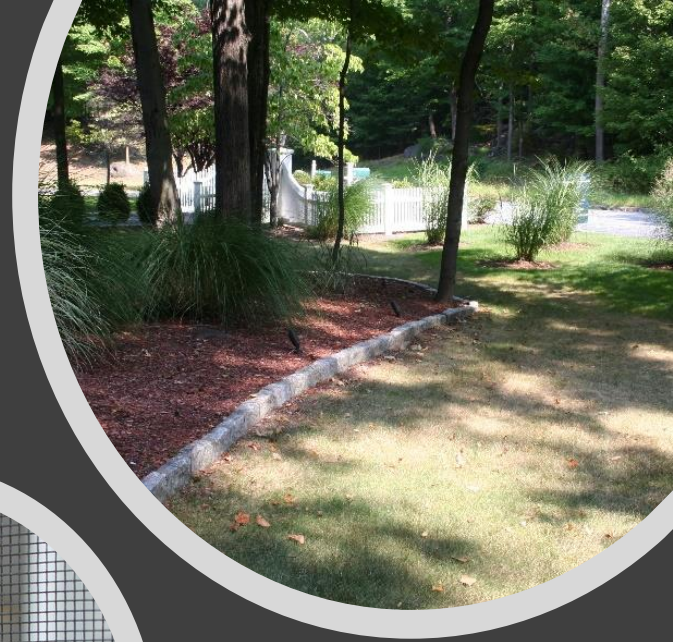


Integrated Pest Management

- IPM integrates all aspects of pest control - “many small hammers”

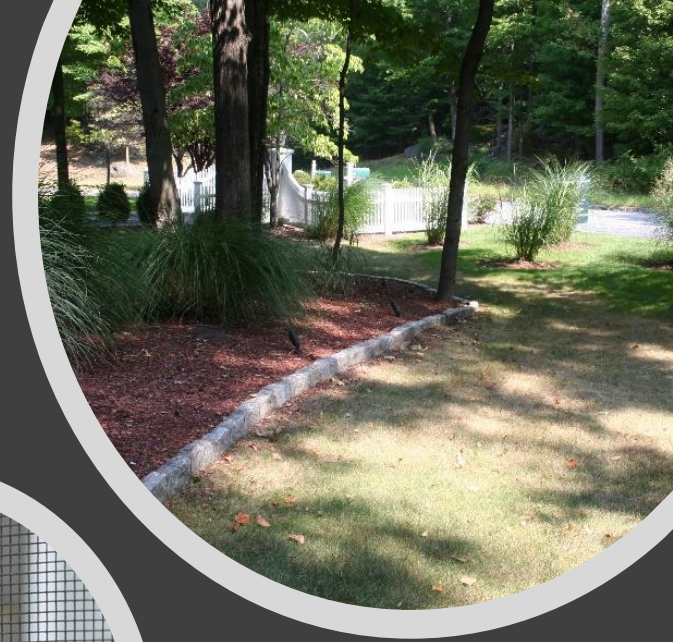
Integrated Pest Management

- IPM integrates all aspects of pest control.
- IPM does include the prevention of problems before they happen.



Integrated Pest Management

- IPM integrates all aspects of pest control.
- IPM does include the prevention of problems before they happen.
- IPM is effective pest management because:
 - There are no silver bullet solutions
 - Pesticide resistance continues to rise



Integrated Pest Management

- Having a plan prevents panic responses



IPM Plan Components

- Planning & Prevention
- Monitoring, thresholds
- Diversity of control options
- Pesticides can be a tool, but does not have to be
- Minimizes economic, health and environmental risks

IPM versus organic

- Organic food production is regulated by the USDA National Organic Program.
- Both IPM and organic approaches seek to minimize the environmental impacts of pest management practices.
- **Organic** is IPM, but with less hammers (synthetic chemical pesticides).

Pesticides impact by:

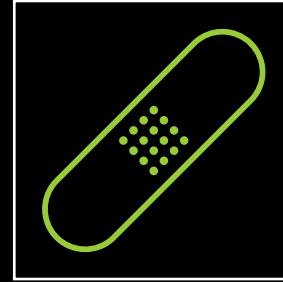


Lethal poisoning

Of individuals

Of food

Of beneficial organisms



Sublethal poisoning

Increases chance of dying from other stresses

Decreases ability to attract a mate, defend a territory, or feed young

Lessens ability to escape from predators

Pesticides and Wildlife

Killing	Reducing	Reducing	Degrading
Killing food plants	Reducing insect populations through loss of food plants	Reducing berry and nut crops through stress or killing of beneficial pollinators	Degrading shelter

Managing pesticides to minimize off-target impacts?

- Read the label
- Choose pesticides based on environmental impacts

PRECAUTIONARY STATEMENTS
HAZARDOUS TO HUMANS & DOMESTIC ANIMALS
CAUTION: Avoid contact with face, eyes or skin. Avoid breathing vapors or spray mist. Harmful if swallowed. Wash thoroughly after handling and before eating or drinking. Do not use on animals.

FIRST AID
IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.
IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth to mouth, if possible. Call a poison control center or doctor for treatment advice.
IF ON SKIN: Take off contaminated clothing. Wash skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.
IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

Have product container with you when calling for help or going for treatment.
Questions??? 800-356-7811, Weekdays from 9-5 EST.

ENVIRONMENTAL HAZARDS
This product is extremely toxic to fish and other aquatic organisms. Do not apply directly to water. Do not contaminate water when disposing of equipment washwaters. Buyer assumes all risks of use, storage or handling of this product and is strict accordance with directions given hereon.

PERMETHRIN CLOTHING & GEAR

INSECT REPELLENT

PREMIUM INSECT REPELLENT CLOTHING PUMP N' SPRAY

ODORLESS EFFECTIVE THROUGH 6 WASHINGS

REPELS & KILLS TICKS, CHIGGERS, AND MOSQUITOES
A TREATMENT FOR CLOTHING & GEAR
DO NOT APPLY TO SKIN

ACTIVE INGREDIENT: Permethrin* 0.50%
INERT INGREDIENTS..... 99.50%
TOTAL:..... 100.0%

*[3-(phenoxyphenyl) methyl (+/-) cis/trans 3-(2,2-dichloroethyl) 2,2-dimethylcyclopropanecarboxylate] Cis/Trans Ratio: min. 35% (+/-) cis and max. 65% (+/-) trans.

CAUTION
KEEP OUT OF REACH OF CHILDREN
See Back Panel for Precautions
EPA Reg. No. 50404-3-58188
EPA Est. No. 58188-FL-1
www.sawyer.com

DIRECTIONS FOR USE
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

SHAKE WELL. BEFORE USING: Do not transfer to another container. Do **NOT** fill neoprene, chiggers, mites and ticks, including ticks which carry Lyme Disease and Rocky Mountain Spotted Fever. This product must not be applied to clothing while it is being worn. Under no circumstances should bare skin or clothing on the body be treated. Do not spray directly on or otherwise allow to come in contact with skin, face, or eyes. This product is to be used as a clothing treatment only. In case of accidental spraying of skin, face, or eyes, see "First Aid" on side panel. Make all applications outdoors.

Activate pump 5-10 times to spray. Completely remove pump top, use just enough repellent to cover clothing, recharging pump as needed.

For six week protection against ticks, chiggers, mites, and neoprene, select an outdoor area protected from the wind, spray outer surfaces of clothing (while not being worn) with a slow sweeping motion to lightly moisten the surface of the fabric, holding pump at a distance of 6 to 8 inches. (A complete outfit consists of shirt, trousers, and socks) Treat outer surfaces of each outfit, front and back, for 30 seconds on each side and allow to dry for at least 7 hours (4 hours under humid conditions). Pay particular attention to socks, trouser cuffs, and shirt cuffs. Use pump bottle with good complete outfit. Do not exceed recommended spraying times. Clothing should be retreated after six weeks or after the sixth washing to maintain adequate protection. In heavily infested areas, protection from ticks will be improved by either wearing the cuffs inside (trouser or taping pant cuffs around legs). Protection from neoprene can be further enhanced by applying an EPA approved repellent to face, hands and other exposed areas of the body.

GEAR: MOSQUITO NETTING, MESH TENTS, CAMPERS, SCREEN ENCLOSURES, SLEEPING BAGS, BACKPACKS AND GEARING CLOTH: Do not treat inside of sleeping bag. Spray exterior surfaces of tent only. Select a well-ventilated outdoor area protected from wind and lay out gear to be treated. Hold pump upright about 6 to 8 inches from surface of the article and spray with a slow sweeping motion to lightly moisten the surface of the fabric. Continue spraying over entire article, until the outer surfaces of the article are moist enough to cause a light color change (or darkening). Pump treated gear and allow to dry for at least 7 hours (4 hours under humid conditions) before using. Do not retreat gear more than once every six weeks.

STORAGE AND DISPOSAL
STORAGE: Store in a cool, dry place inaccessible to children. **IF EMPTY:** Do not reuse this container. Place in trash or other for recycling if available. **IF PARTLY FILLED:** Call your local solid waste agency for disposal instructions. Never place unused product down any drain or outdoor drain.

SAWYER

EPA Reg. No. 50404-3-58188
EPA Est. No. 58188-FL-1
www.sawyer.com

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NYS IPM Program Resources

- Environmental Impact Quotient

EIQ Calculator

[New York State Integrated Pest Management](#)

Environmental Impact Quotient (EIQ)

Field Use Calculator

Version 1.0

Start typing or select an active ingredient:

Active ingredient % (Example. 15% = 15):

Product rate (Example. 3lb/acre = 3):

Product measurement unit:

dry ounces (oz)

Application area:

1000 ft²

Liquid product formulations use the specific density of water to calculate EIQ. For best results, use the weight of a standardized product volume instead.

[Submit](#)

DISCLAIMER. Results generated from the Field Use EIQ Calculator are not guaranteed and should never be the only source of information when making a pesticide management decision. In no event shall Cornell University or the New York State IPM Program be liable to any party for direct, indirect, special, incidental, or consequential damages, including lost profits, arising out of the use of the Field Use EIQ Calculator.

Home remedies?

- If used to kill or repel, it is a pesticide. We CANNOT recommend!
- A story of an idea: Would adding a surfactant make a yellow jacket trap more efficient?



**DEC Decision –
Surfactants can be
used for mechanical
efficiency.**

Let the testing begin!



DEC Decision –
Surfactants can be
used for mechanical
efficiency.

Let the testing begin!



**DEC Decision –
Surfactants can be
used for mechanical
efficiency.**

**Testing doesn't
support efficacy.**



Your turn– use the chat box

- What home remedy recommendations you have heard.



Steven Katovich,
USDA Forest
Service,
Bugwood.org



NIAID, flickr

Why is IPM important?

There are health concerns and risks from pests, pest allergens, and pesticides.



Integrated Pest Management

- Relies on knowledge of:
 - pest biology and ecology
 - environmental information, and
 - available technology

Ecology 101

- Ecology is the study of living things in relation to each other and their environment.
 - What is it?
 - Why is it here?
 - How many are there?
 - How does it survive?



Levels of Ecology

- Species
- Population
- Community
- Ecosystem





A single type of organism, such as a white-tailed deer, Asian tiger mosquito, or spinach

Species

Species

- Identification
- Life history
- Behavior

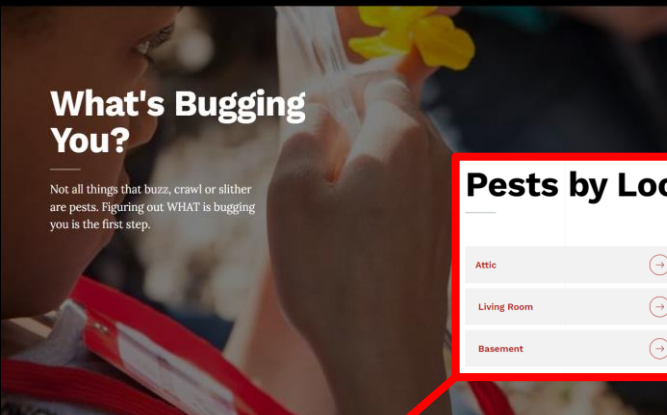


NYS IPM Program Resources

- What's Bugging You?

New York State Integrated Pest Management

[RISK ASSESSMENT](#) - [RESEARCH & INITIATIVES](#) - [OUTREACH & EDUCATION](#) - [ECO RESILIENCE](#) - [ABOUT US](#)



What's Bugging You?

Not all things that buzz, crawl or slither are pests. Figuring out WHAT is bugging you is the first step.

Pests by Location

Attic	Bathroom	Bedroom
Living Room	Kitchen	Garage
Basement	Patio	Lawn and Garden

Identify and Understand

We're here to help you identify, understand and, where needed, safely manage the critters found in and around your home, garden, farm, school, places of work and worship. Use of the word "critter" is intentional; not all things that buzz, crawl or slither are pests! Some insects may be pollinators that play an important role in the ecosystem, and some animals can help reduce the numbers of ticks and other pests in your yard.

[What's Bugging You Critters | A-Z](#)

[Pests by location](#)

SEASONAL PESTS

Winter Pests

There are many critters that will come in on a potted plant, or through a crack, an open door, a hole in a screen, a gap in siding or soffits, or a piece of firewood. The larger the hole, the larger your potential unwanted guest.

Winter arthropod pests:

[Red Bugs](#) • [Boxelder Bugs](#) • [Brown Marmorated Stink Bug](#) • [Carpenter Ants](#) • [Cockroaches](#) • [Earwig](#) • [Eles](#) • [Moisture Pests](#) • [Multicolored Asian Lady beetle](#) • [Pantry Pests](#) • [Spiders](#) • [Ticks](#) • [Western Conifer-Seed Bug](#)

Other winter pests:

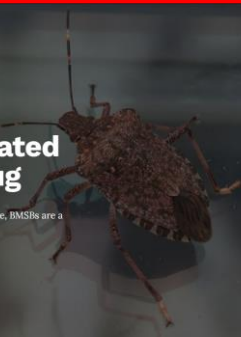
[Mold](#) • [Mice and Rats](#) • [Wildlife](#)

[Next Spring](#)



Brown Marmorated Stink Bug

Not just an indoor nuisance, BMSBs are a major agricultural pest.



What's Bugging You?

www.DontGetTickedNY.org

Ticks

Ticks and tick-borne diseases have become a significant public health issue in New York State.



Don't get ticked

Learn about ticks so you can better protect yourself, your family, and your pets from tick-borne illness.

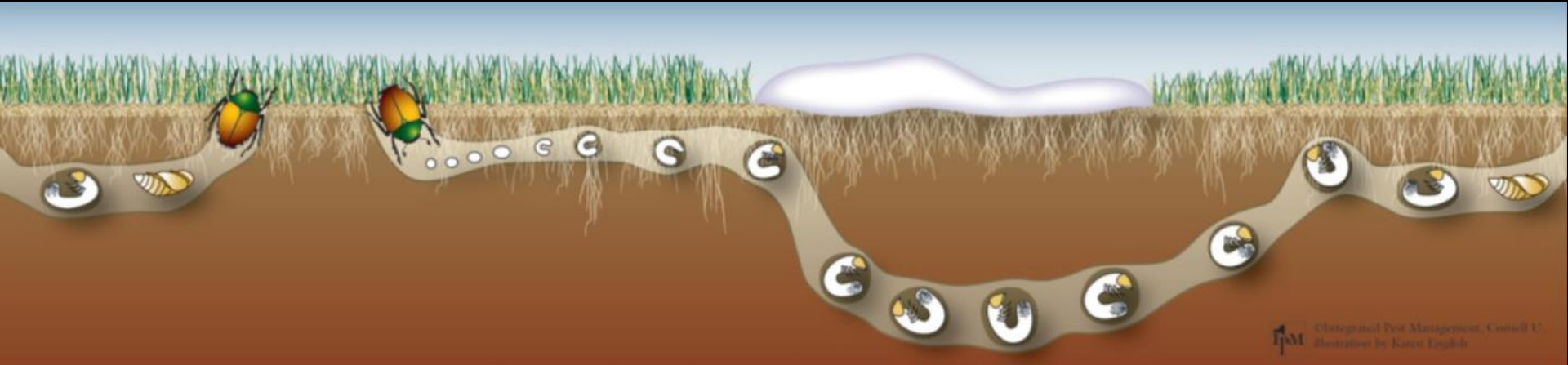
- [Tick biology and identification](#)
- [Protecting yourself from ticks](#)
- [How to remove a tick](#)
- [Managing ticks in the landscape](#)
- [Tick-borne illnesses](#)

Ticks

What are ticks?

Ticks are arachnids closely related to mites and spiders. All stages of ticks (except eggs) feed on blood for energy to grow and later reproduce. Several tick species are a human health concern in New York.

White Grubs



IPM Integrated Pest Management Council U
Illustration by Karen English

JUNE — JULY		AUG	SEPT	OCT	NOV — APRIL	MAY	JUNE
Pupation and adult emergence		Egg laying & hatching		Larval growth		Downward migration; hibernation; overwintering grubs	
				Upward migration; short feeding period; pupation			
		Scout					
		Treatment with EPNs or a curative pesticide				Treatment with systemic product	

Indicates When Feeding Damage Occurs

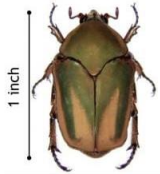
Treatment with systemic product

Grub Species Life Cycles

Green June Beetle

(*Cotinis nitida*)

ADULT



GRUB



RASTER

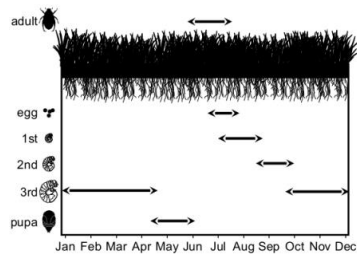


Treatment Thresholds

- 5 (per sq. foot)
- 1 (per 4.25-inch cup cutter core)



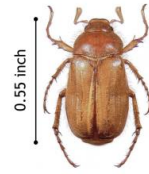
Life Cycle Graph



European Chafer

(*Amphimallon majale*)

ADULT



GRUB



RASTER

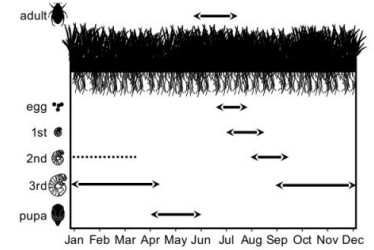


Treatment Thresholds

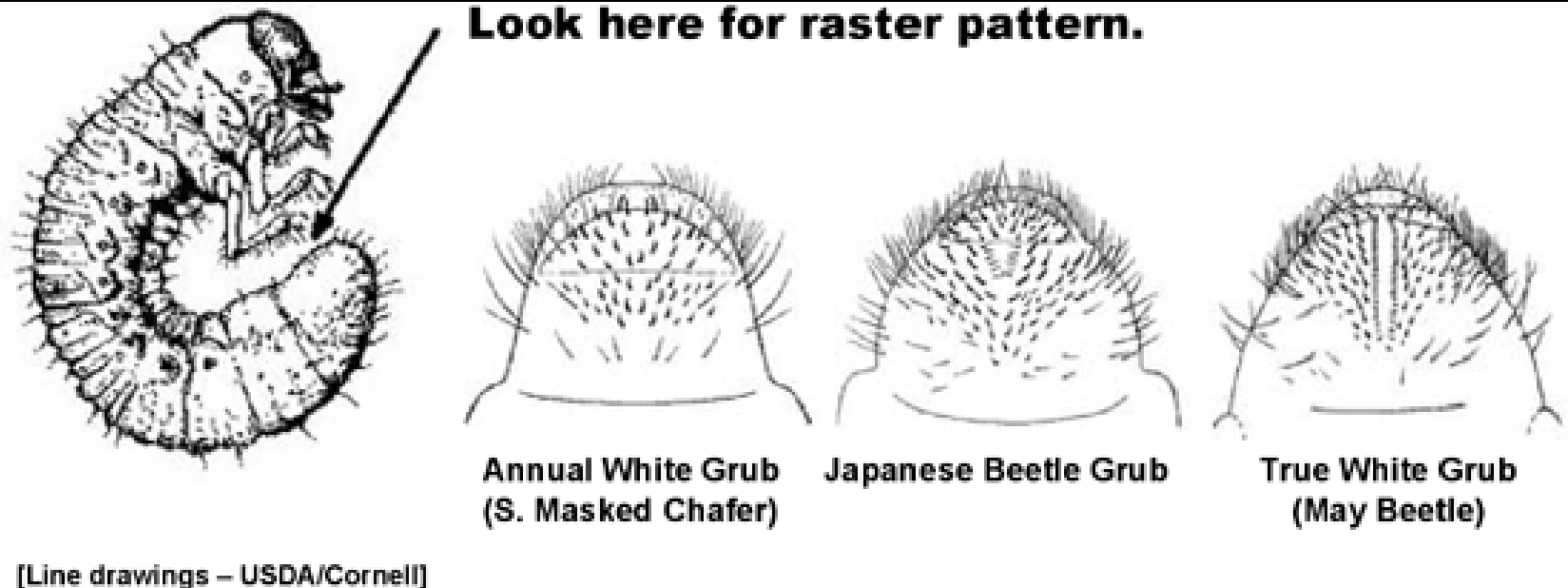
- 5-8 (per sq. foot)
- 1 (per 4.25-inch cup cutter core)



Life Cycle Graph



White Grub Diversity



Identification

ENTOMOLOGISTS BE LIKE

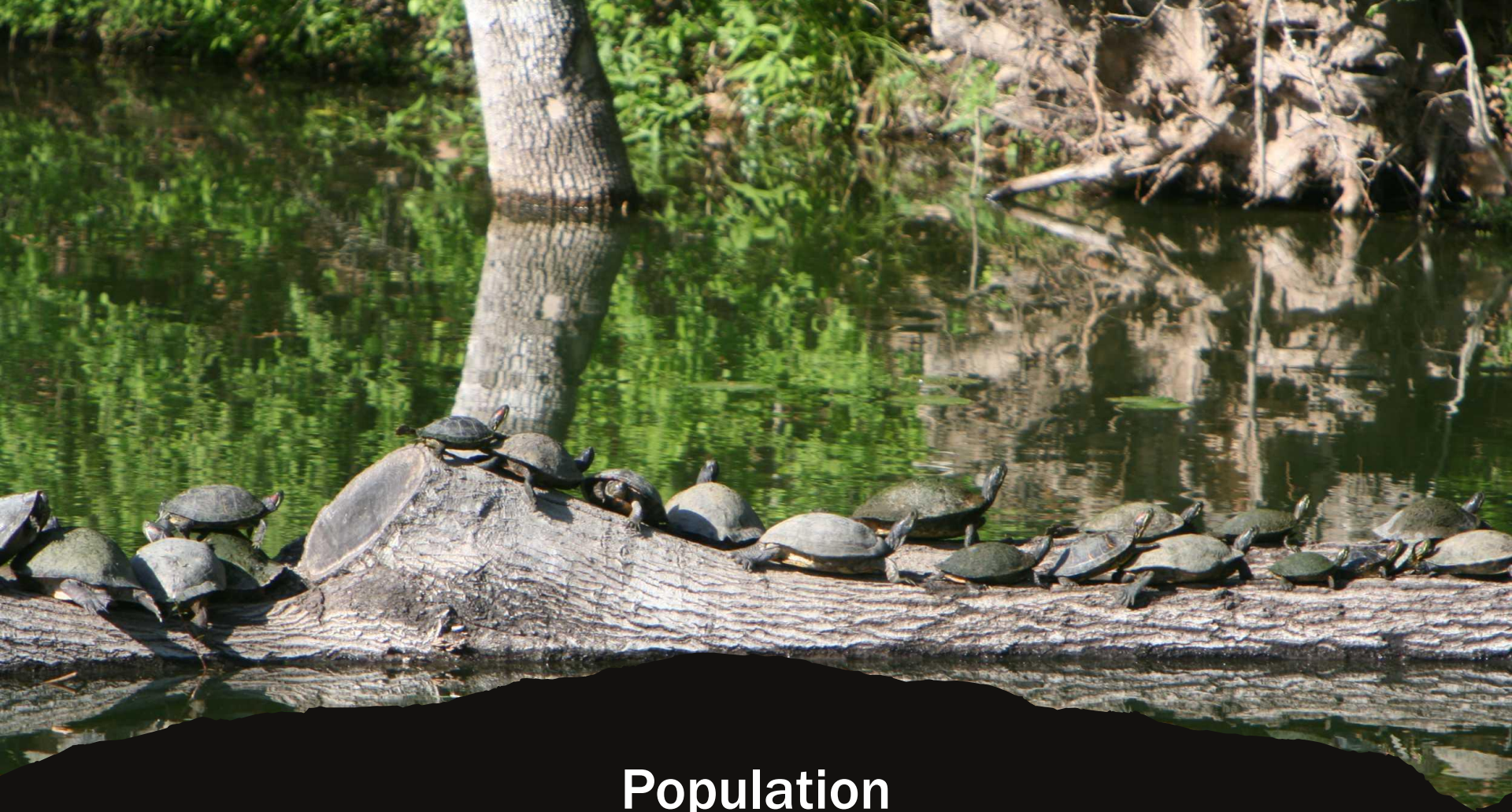


SEE

COMPLETELY DIFFERENT SPECIES

Identification





Population

A group of the same species, such as a herd of deer or a swarm of mosquitoes.

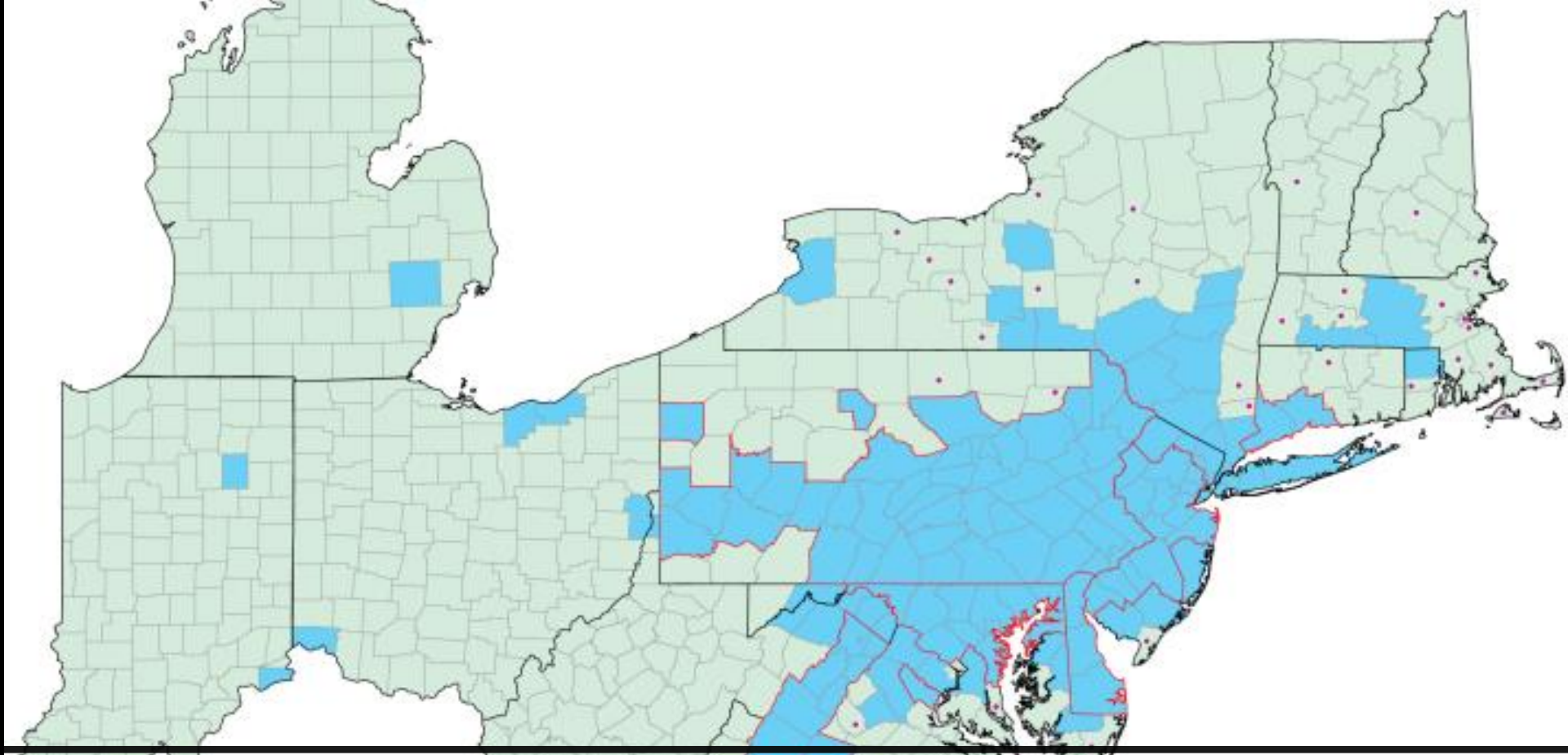
A photograph of a group of deer in a snowy forest. The deer are of various ages and are looking towards the camera. The background is filled with snow-covered trees and a bright sky. The overall scene is a natural, winter setting.

Population

- Intra-species Competition
- Density
- Distribution
- Behavior

IPM Implications – IPM Thresholds

- There is a big difference between an incident and an infestation.
- Individuals rarely give us problems.
- Population size matters.
- The goal is not to kill every individual but to manage populations at tolerable levels.
- Thresholds tell us when its time to take action



Incidence vs. Infestation – Spotted Lanternfly



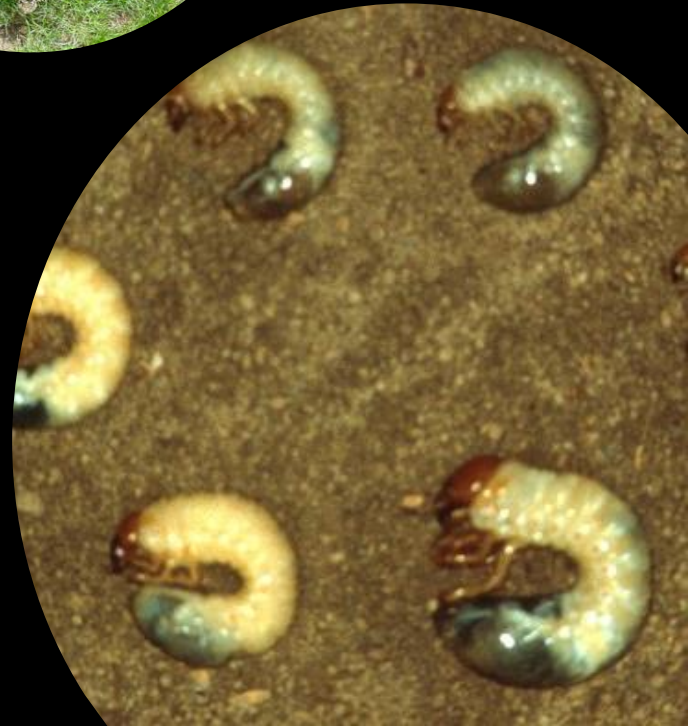
Incidence vs. Infestation

Photo courtesy of www.bedbugcentral.com



Threshold Example

- White Grubs
 - Sample 1 square foot
 - Count grubs
 - Threshold Levels
 - 8-10 grubs per square foot
 - If irrigated and well fertilized lawn, then 12-15 per square foot





An ecological community is made up of many *different* populations of species.

Community

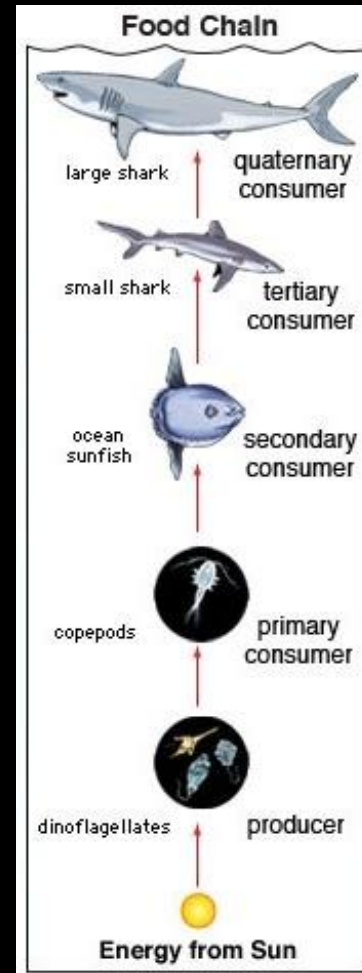
Community

- Food Web
- Interspecific competition
- Species diversity



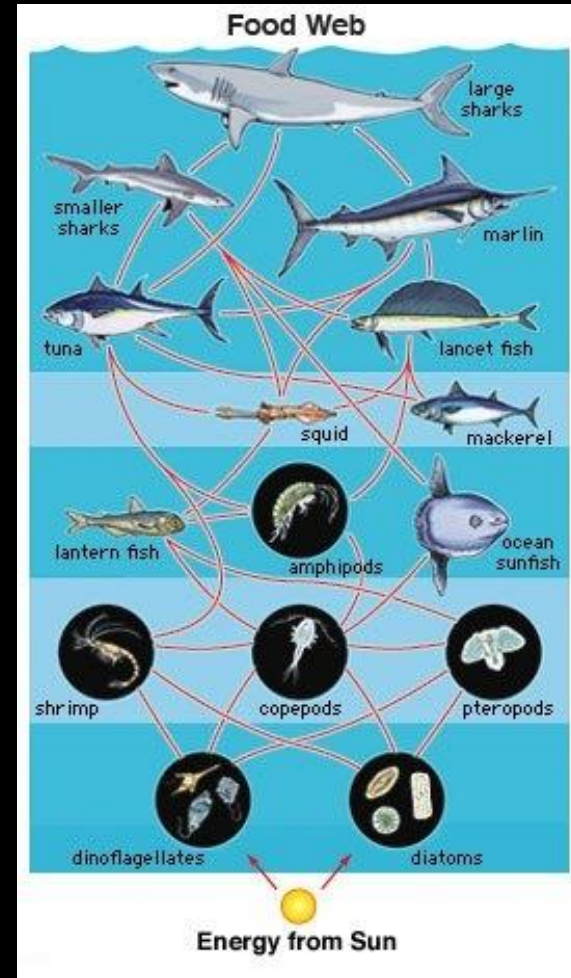
Food Chain

- Looking at Community-based Ecology
- Very simple
- Arrows point in one direction



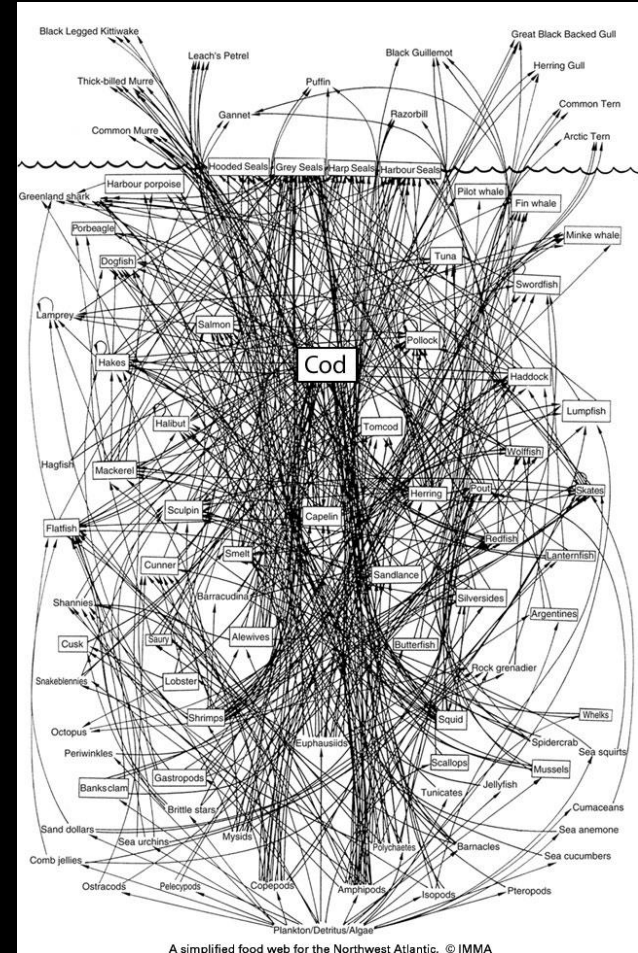
Food Web

- Simple
- Recognizes that more than one species will eat another species
- Arrows still travel in one direction
- If reality, VERY vulnerable

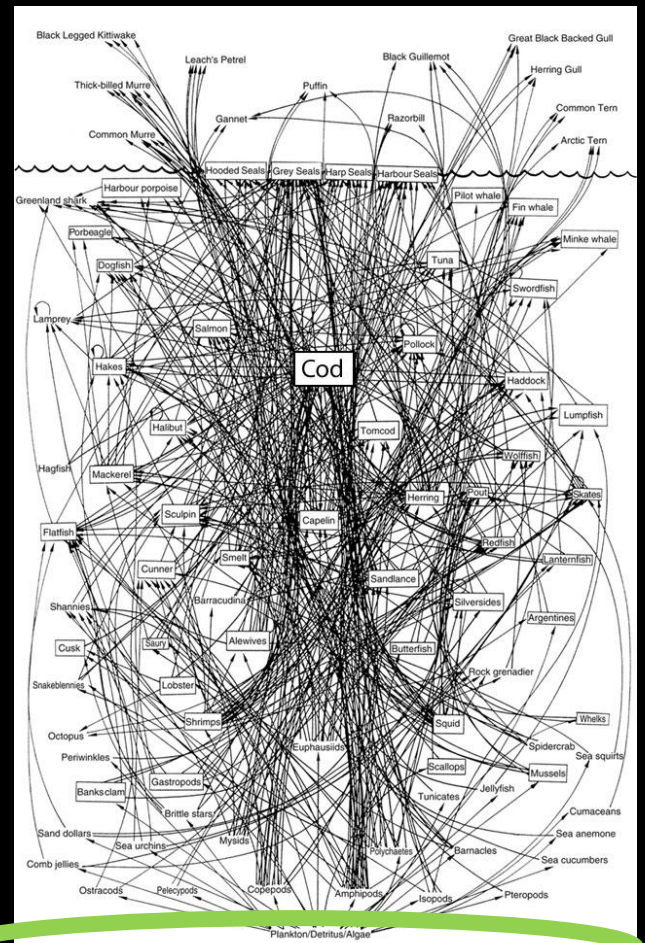


Food Web

- Very Complex
- Rich biodiversity
- Copious connections
- Significant overlap
- High resistance to disruptions

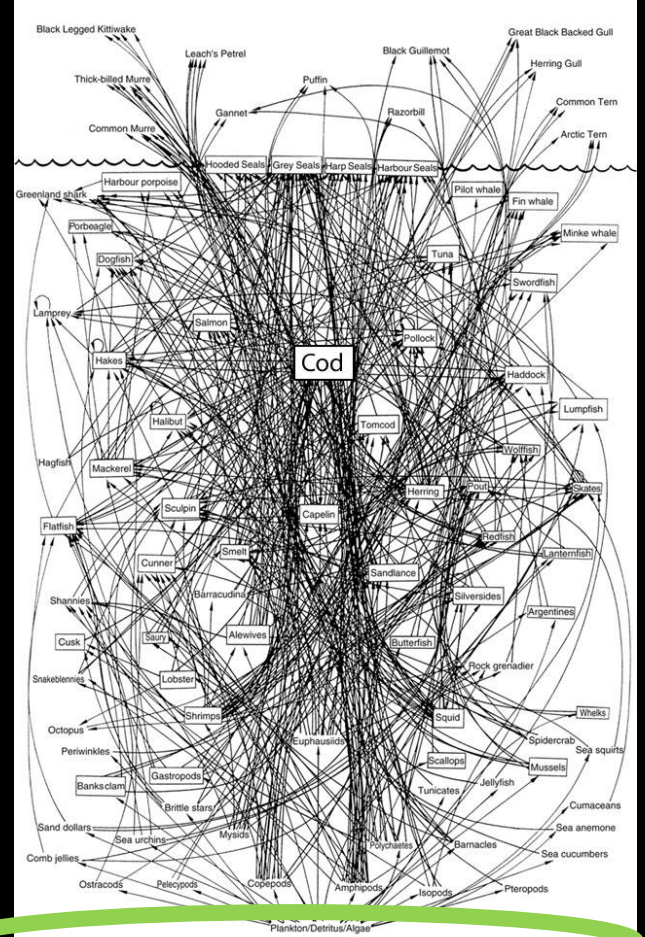


Food Web



A simplified food web for the Northwest Atlantic. © IMMA

Food Web



A simplified food web for the Northwest Atlantic. © IMMA

IPM

Implications

- Diversity is a casualty of control
- Simple systems are vulnerable systems



IPM

Implications

- Whenever possible, manage for diversity
- NYSIPM Research - Increasing plant diversity on Christmas tree farms



NYSIPM/CCE Demonstration

- Increasing plant diversity on lawns



May 2022



Fall 2022



Mast year

2019



2020

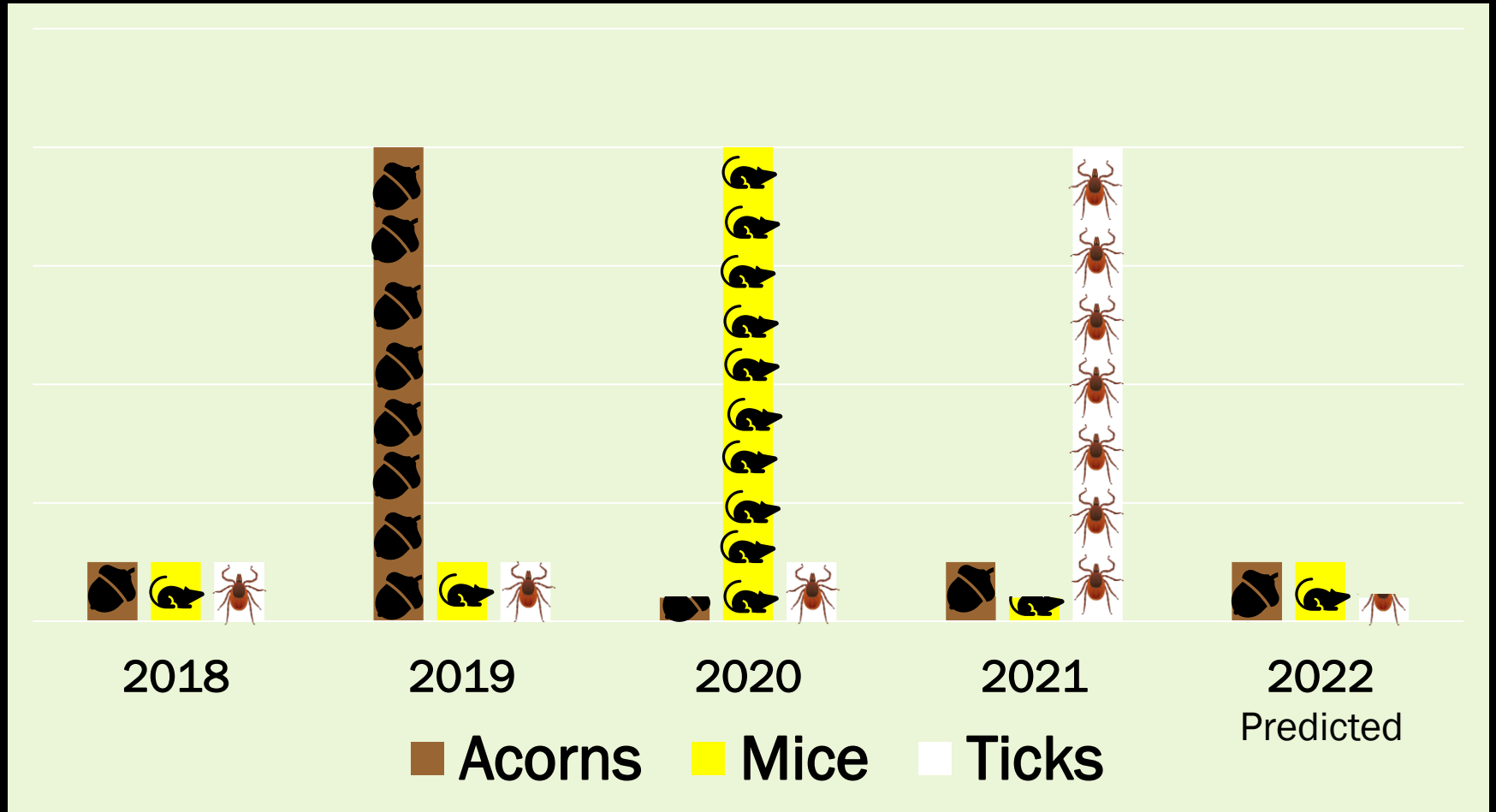


2021



Photo: Jesse Brunner

Mast year



IPM Implications

- Crop rotation or skipping years can prevent crop specific pests from increasing year to year



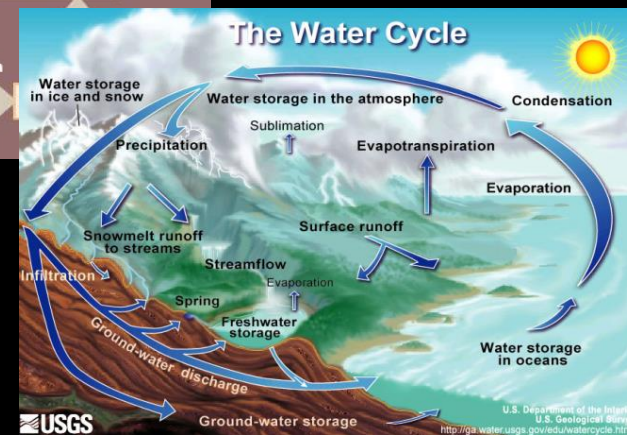
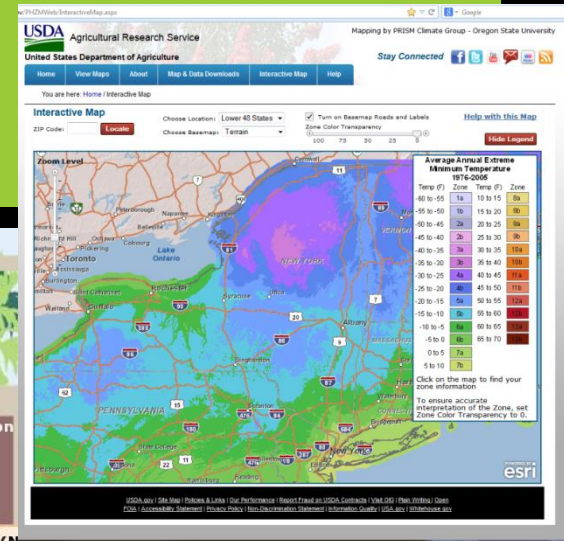
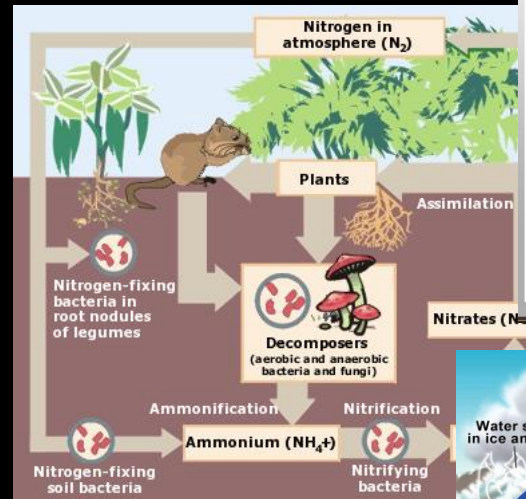


Ecosystems

- All living organisms, their physical environment, and all their connections in a particular unit of space

Ecosystems

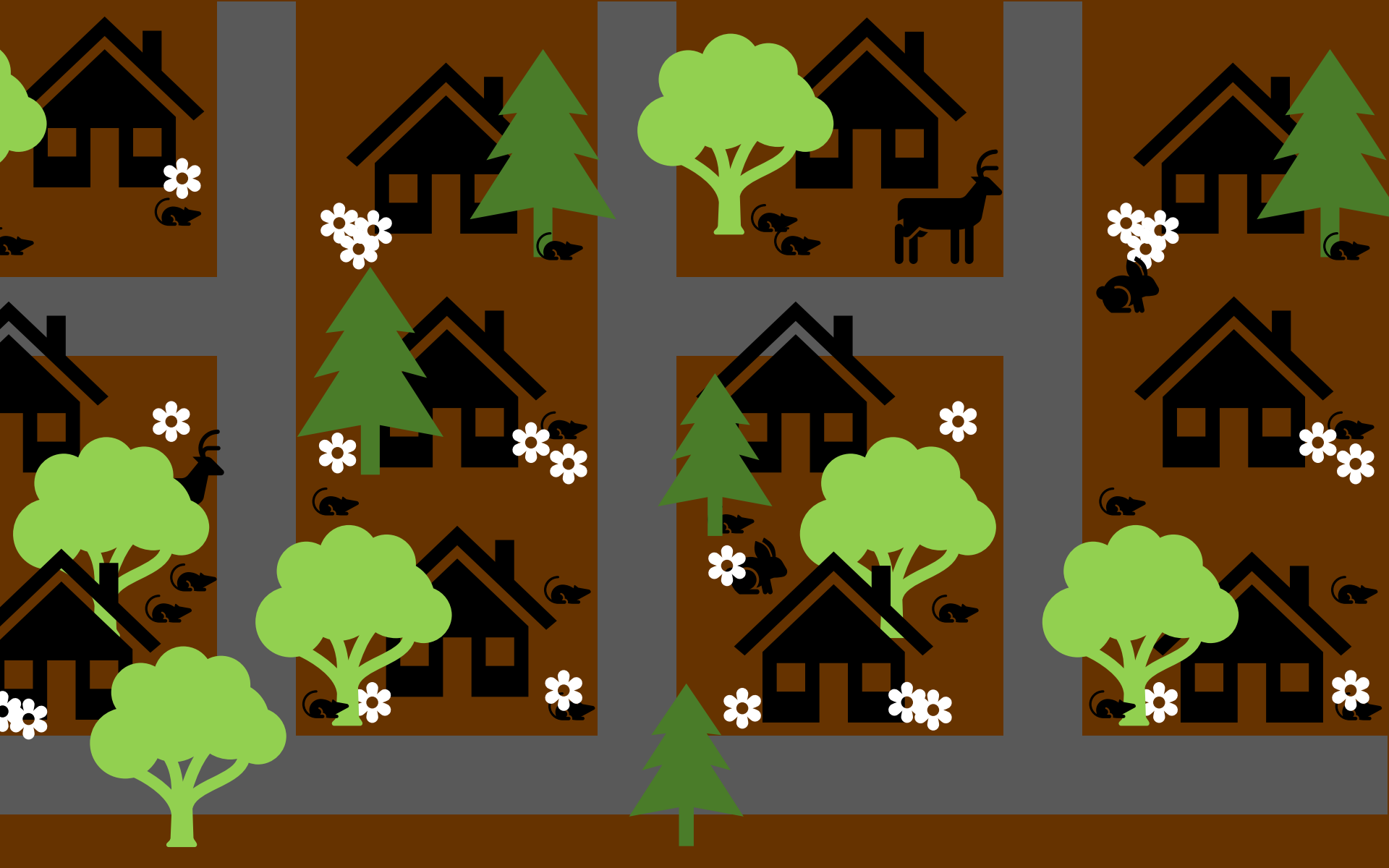
- Include Abiotic Factors
 - Landform
 - Geology
 - Precipitation
 - Sun
 - Wind
 - Water
 - Soil
 - Climate
 - Microclimate











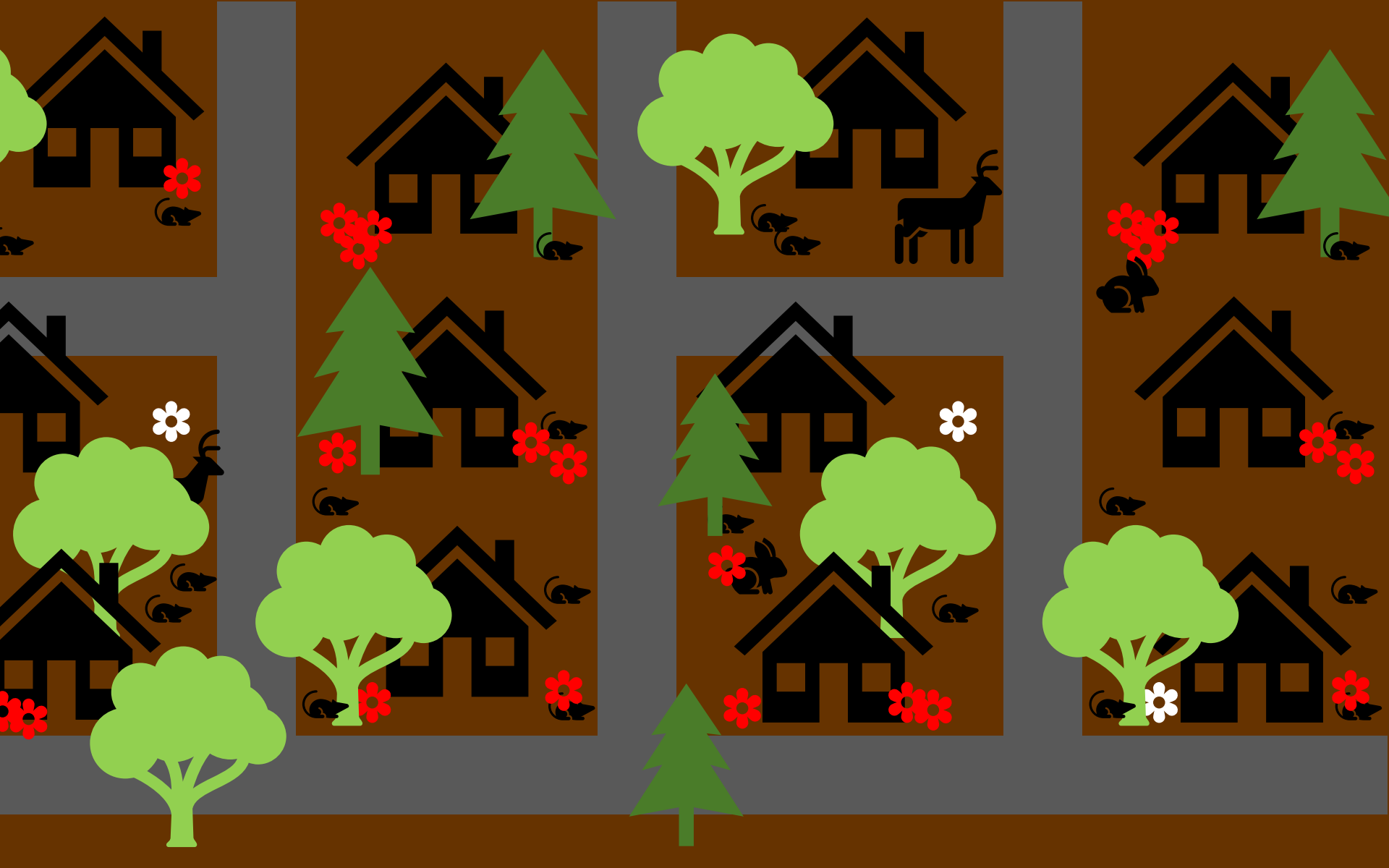
IPM

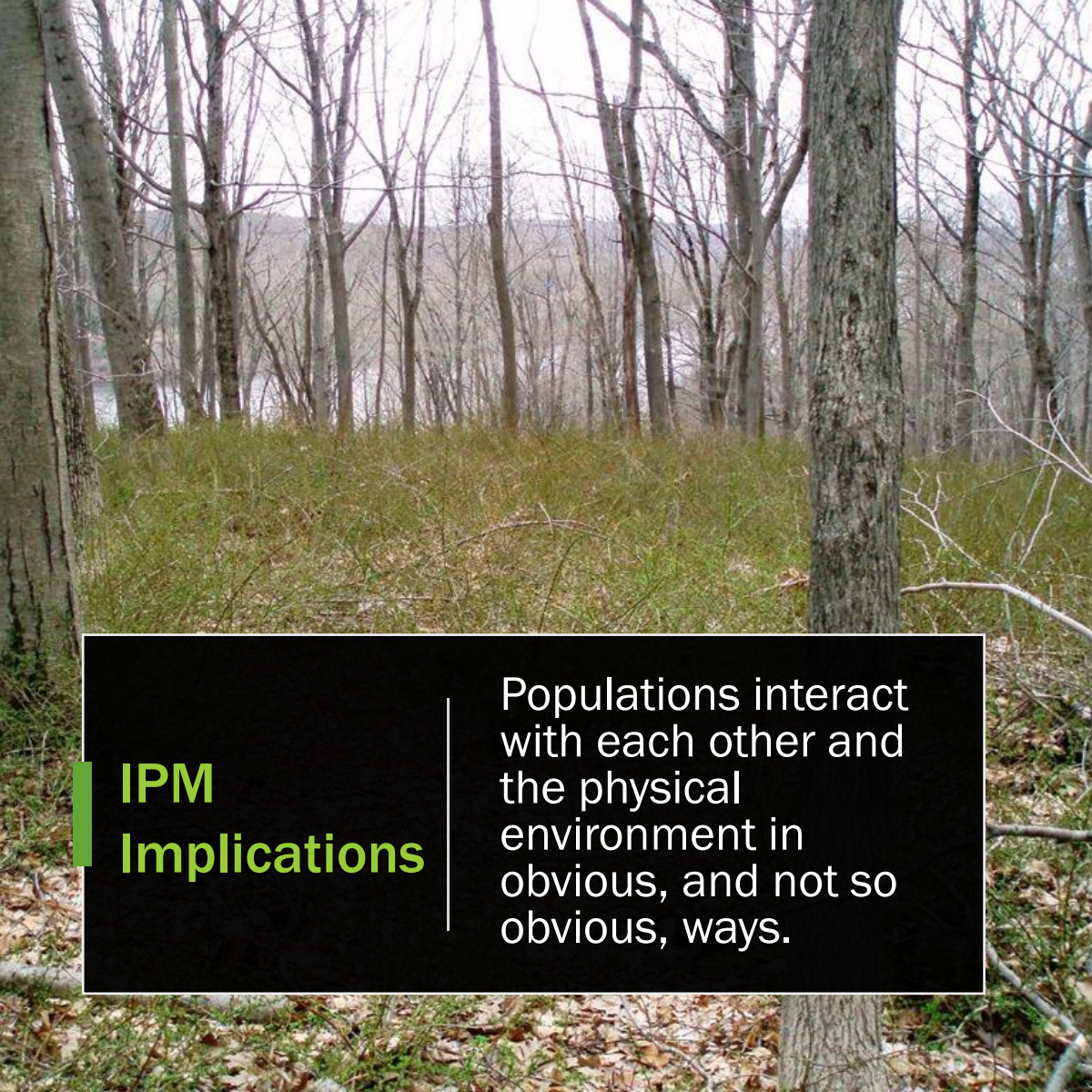
Implications

- Populations interact with each other and the physical environment in obvious, and not so obvious, ways.

Photo: Jesse Brunner



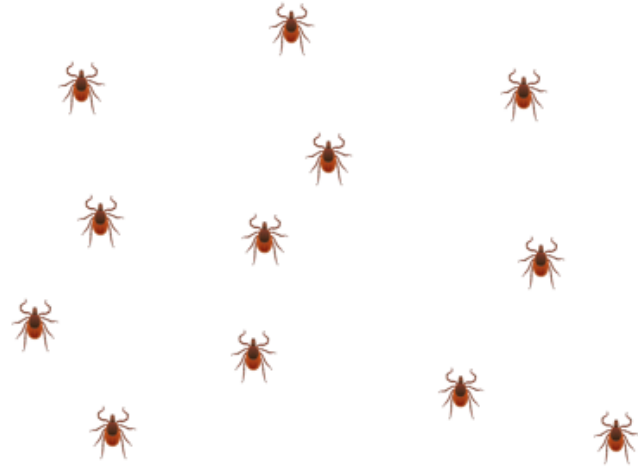




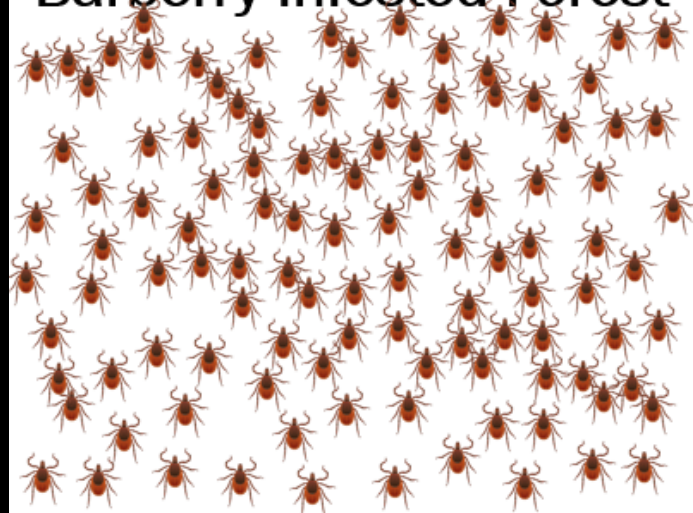
IPM Implications

Populations interact with each other and the physical environment in obvious, and not so obvious, ways.

Uninfested Forest



Barberry Infested Forest



Your turn– use the chat box

- What pest issues are we bringing on ourselves?



Ecosystems versus Habitat



Ecosystems - All living organisms, their physical environment, and all their connections in a particular unit of space



Habitat - a place where a species naturally lives; its address



When you understand a species' habitat needs, you can manage the landscape to discourage or encourage them.



Ecology 101 - Habitat

- Consists of four basic needs

Ecology 101 - Habitat

- Consists of four basic needs
 - Food



Ecology 101 - Habitat

- Consists of four basic needs
 - Food
 - Water



Terry Spivey, USDA Forest Service, Bugwood.org

Ecology 101 - Habitat

- Consists of four basic needs
 - Food
 - Water
 - Cover/Shelter



Dan Dzurisin, Flickr.com

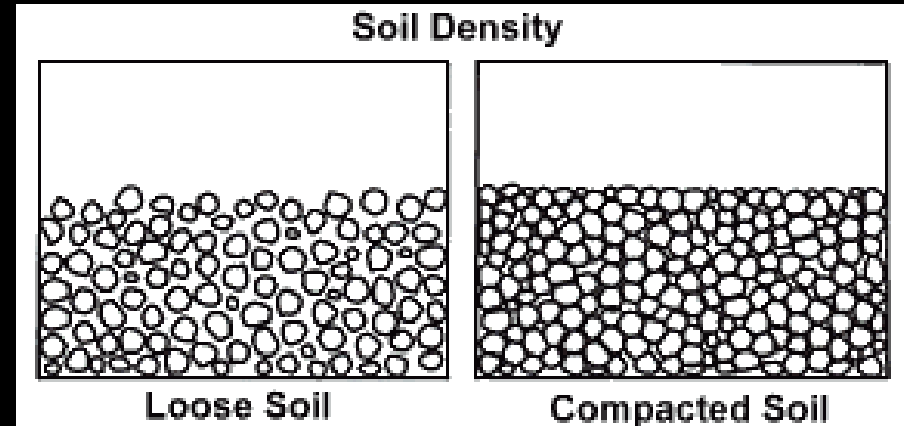


Ecology 101 - Habitat

- Consists of four basic needs
 - Food
 - Water
 - Cover/Shelter
 - Space



Henry T. McLin, Flickr.com



IPM Implications

- We can manage the landscape to:
 - Prevent problems
 - Provide the best possible habitat for the desired plant
 - Reduce pests' habitat
 - Enhance beneficials' habitat
- Think in terms of:
 - Food
 - Water
 - Shelter
 - Space



Habitat

- Food
- Water
- Cover
- Space





Food - Grass



Food - Leaves



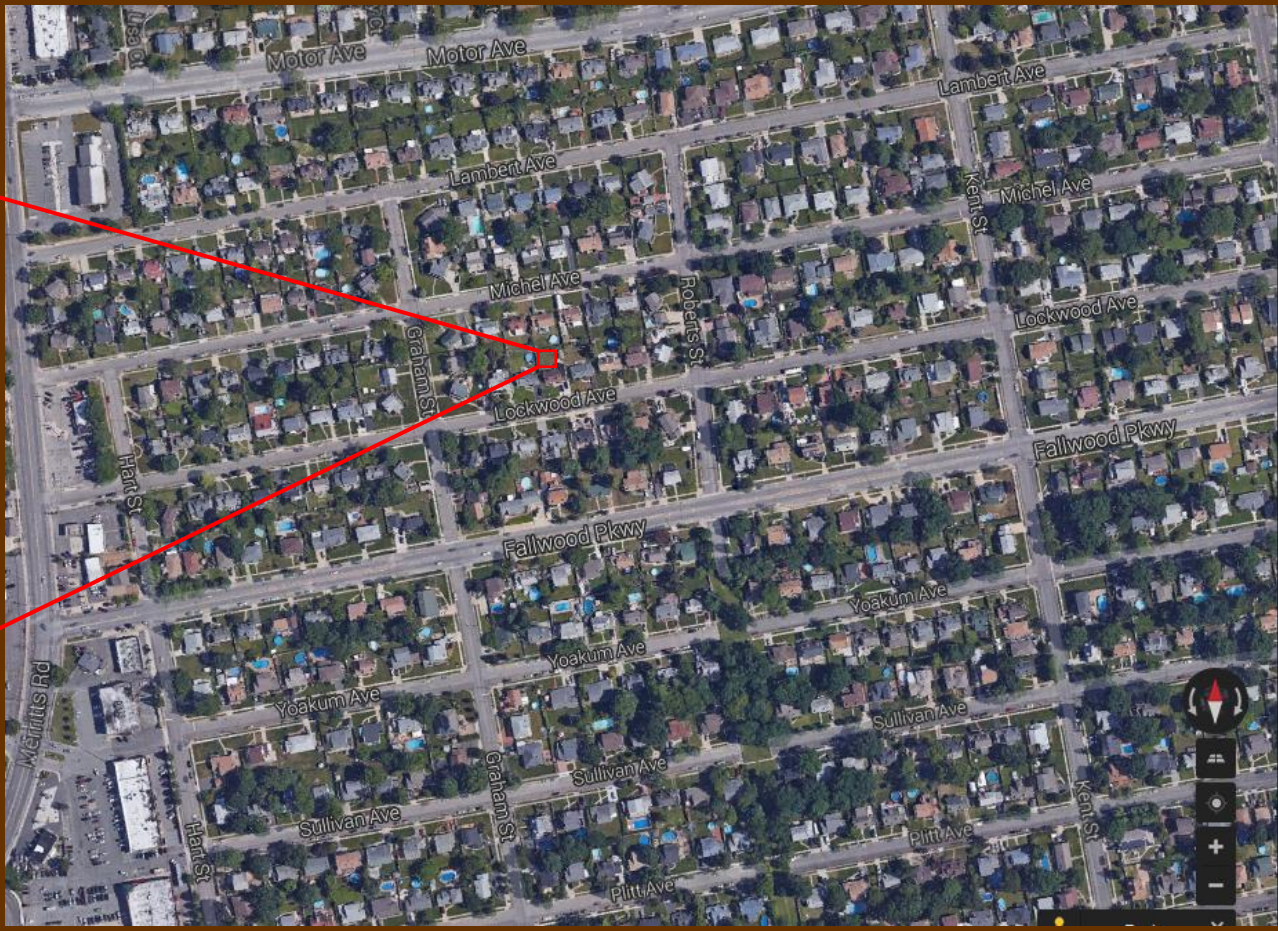
Food – Bark and Twigs



Food – Shoots and Roots



**Food –birds and
mammals**





Jamuudsen, flickr



John Benson, flickr

Food – Insects and Arachnids



Telepathy0.0, flickr



Lisa Yarost, flickr

Food – Insects and Arachnids



**Food –
Nectar/Pollen**



Monikah Schuschu, flickr

Food - Seeds



Laurie Hulsey, flickr



Matt Hrkac, flickr


Food - Mast



Food - Fruit

**Food -
Nutrients**



A photograph showing a large pile of straw and green grass in a garden bed. The straw is piled on top of the grass. In the background, there is a wooden fence and a green tarp. The scene is outdoors, likely in a garden or farm setting.

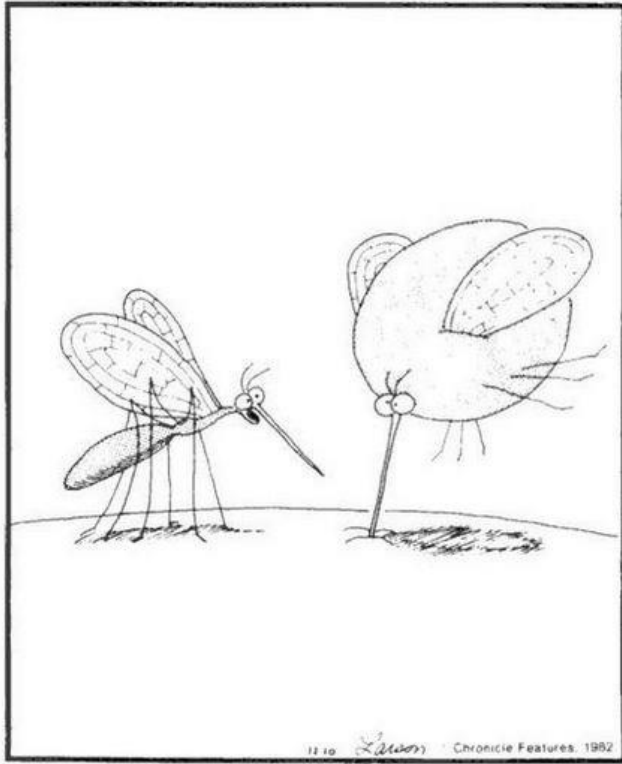
**Food –
Possibly all of
the above**



Food - Poor sanitation

THE FAR SIDE

By GARY LARSON



11 10 Larson Chronicle Features 1982

"Pull out, Betty! Pull out! . . . You've hit an artery!"

Food – Us



Food – Our stuff



One man's
trash is
another
critter's
treasure





IPM Implications

- We can manage the landscape to:
 - Remove pest food sources
 - Add food sources for beneficials and predators

IPM

Implications

- We exclude pests from food sources



**What I thought establishing
habitat for beneficial insects
would be like...**



What it's actually like.



IPM Implications

We can manage pests by adding food sources for competitors and predators.

NYS IPM Program Resources

- Biocontrol webpage
- Biocontrol Bytes blog



Biocontrol

Learn about biocontrol and how to use it around your farm, garden or home

Biological control (or biocontrol for short)

Reducing pest populations (or maintaining them at a low level) using living organisms (natural enemies, biocontrol agents) or the things they produce. It is one component of an integrated pest management (IPM) strategy that helps you reduce risks to yourself and the environment.

- How do I use biocontrol? →
- Biocontrol Resources →
- Biology behind biocontrol →
- Biocontrol Agents →

Biocontrol Bytes

COMMUNITY IPM, CONSERVATION BIOCONTROL, HABITAT AT HOME, HOME GARDENS, INSECT, IPM, POLLINATORS

CHOOSING PLANTS FOR BENEFICIAL HABITAT AT HOME

© MAY 18, 2020



A bee gathers pollen from a cosmos flower.

Recall from this post that I'm creating habitat for beneficial arthropods (including insects, spiders, predatory mites, etc.) around my house this spring. Because more of us may be doing this while we're staying home to keep each other safe, I'm sharing my experiences here (as well as on [Twitter](#) and [Instagram](#)). The previous post covered site selection. Today I will talk about the species I've chosen (and why).

What I'm planting in my yard



What is biocontrol?

Pests and natural enemies might be *vertebrates*, *invertebrates*, or *microorganisms*.



Aphids and ladybugs are a biocontrol example you are probably familiar with. Ladybugs (natural enemies, biocontrol agents) eat the aphids (pests) that might otherwise damage plants.

Types of Biocontrol

- Conservation biocontrol
- Classical biocontrol
- Augmentative biocontrol

Biology Behind Biocontrol



IPM Implications

We can use food as bait to capture pests.

Habitat

- Food
- **Water**
- Cover
- Space



Will C, Flickr



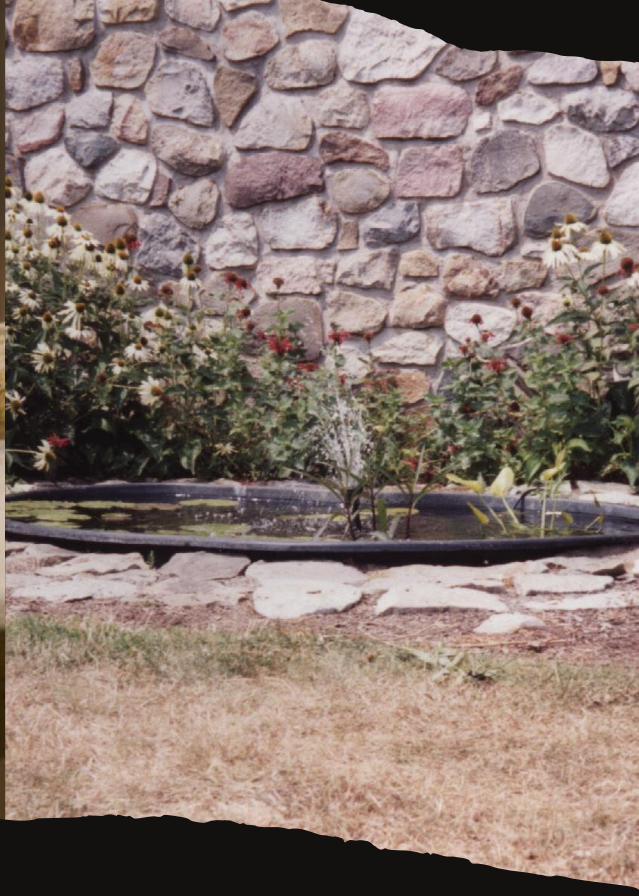
Water – Natural Lakes, Ponds, Wetlands



Water - Rivers and Streams



John Brighenti, flickr



Water – Supplemental Structures



Water – Irrigation

CipherN, flickr

Water – Poor Maintenance



IPM Implications

- Adding water can improve habitat for turfgrass and landscape plants.
- Water provides habitat for beneficials and pests.



IPM Implications

- Too much or too little water damages roots
 - Is it pest damage or drought damage?
 - Yellow color attractive to insects





IPM Implications

Too much water

Fungus gnat habitat

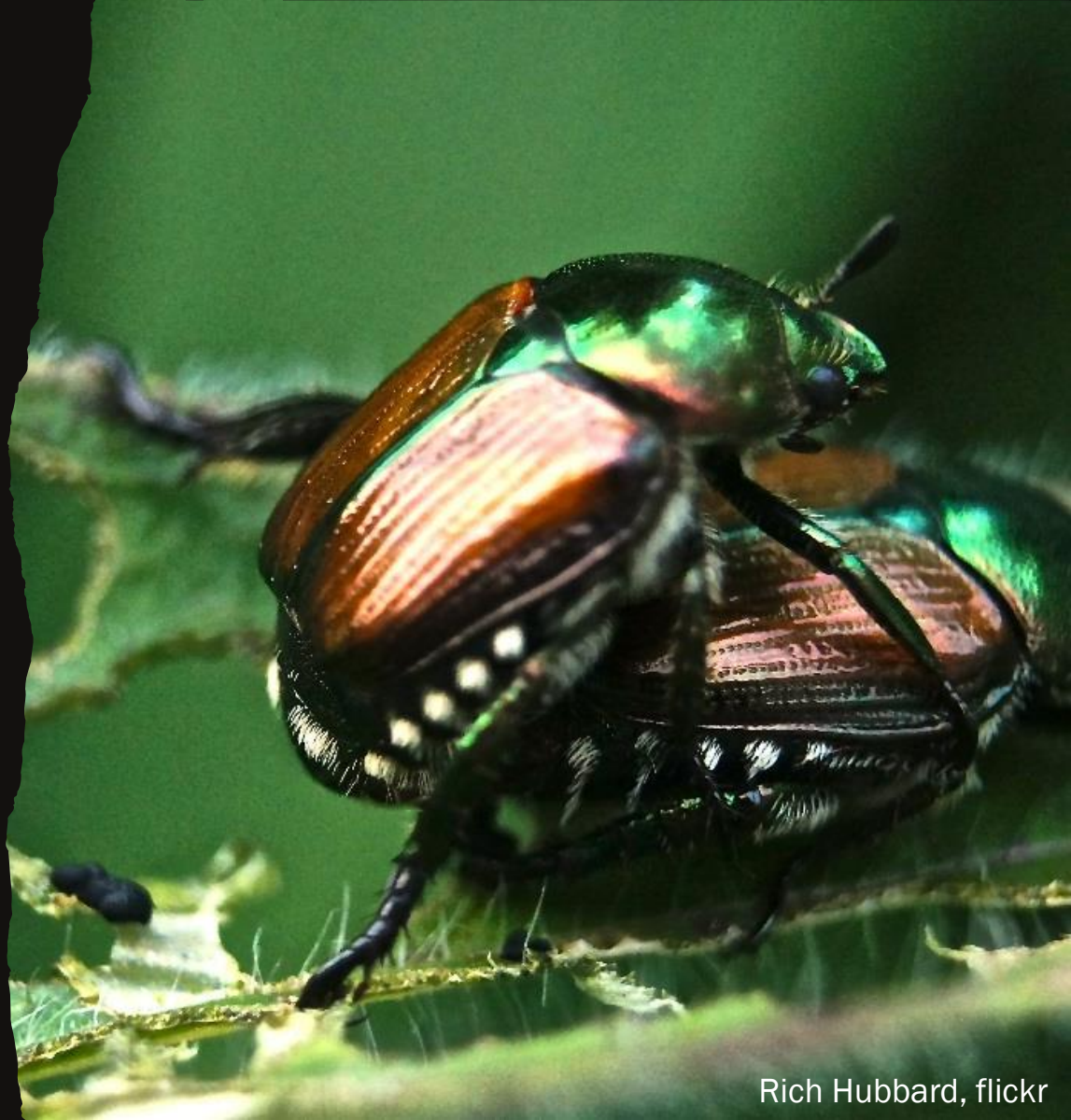
IPM Implications

Removing water
can help prevent
some pests.



IPM Implications

“To reduce the risk of white grubs in lawns, do not irrigate in June and July to create drier soils which are less attractive to egg laying females.” - Dr. Jonathan Larson, UNebraska



Habitat

- Food
- Water
- Cover/Shelter
- Space





Shelter – Nesting Sites



Shelter – Natural Vegetation



Shelter – Rock Piles/Walls

Redi-Rock International, flickr



Shelter – Supplemental Structures



Audra, flickr

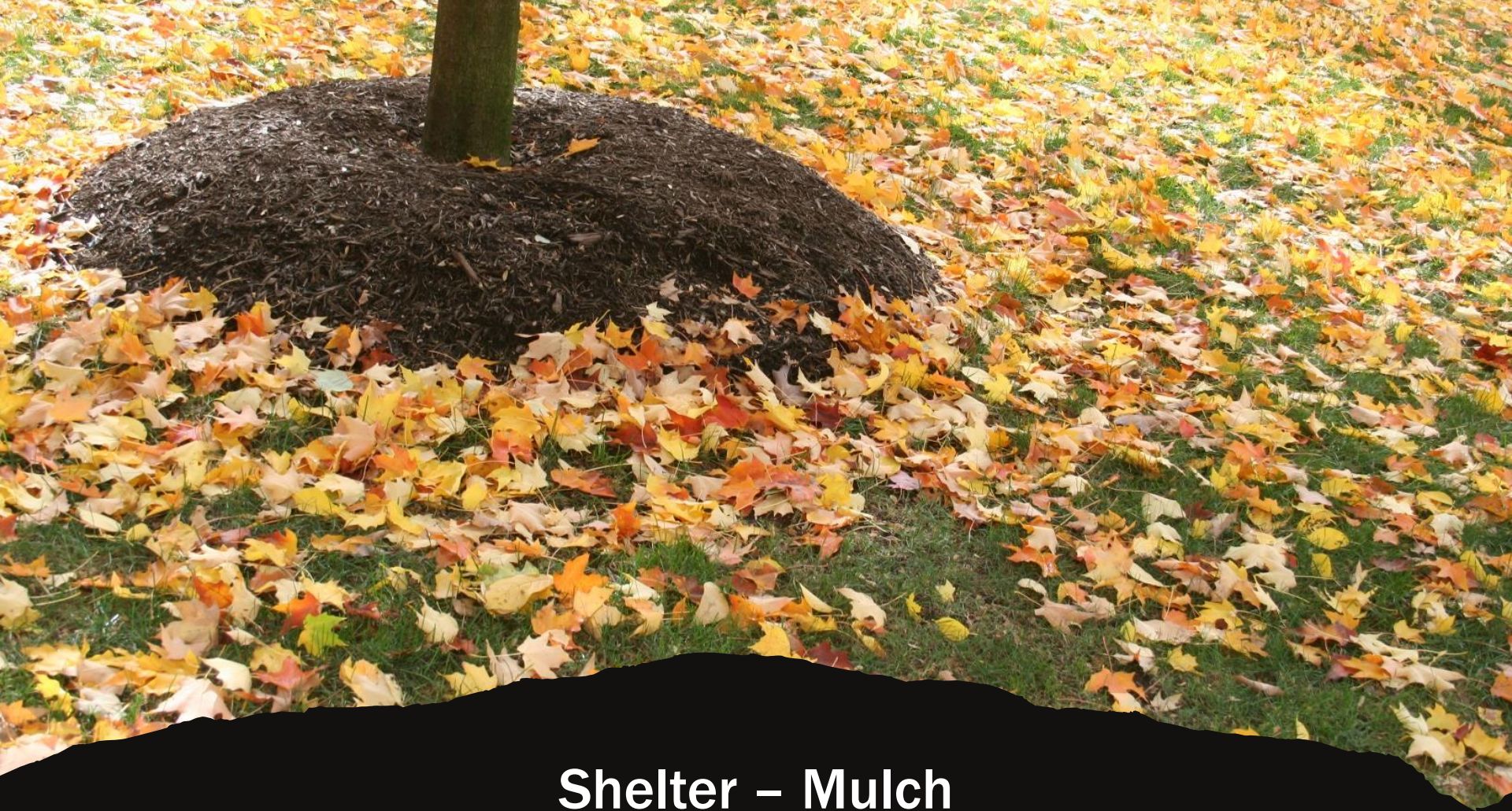


naturalhistoryman, flickr



lpfearn, flickr

Shelter – Supplemental Structures



Shelter – Mulch



Shelter - Leaves

Penn State, flickr



Shelter – Thatch



Shelter – Snow



Shelter – Invasive Plants

John Ruter, University of Georgia, Bugwood.org



Shelter - Vegetation near buildings



Shelter - Poor maintenance



Shelter - Clutter

IPM Implications – Remove habitat

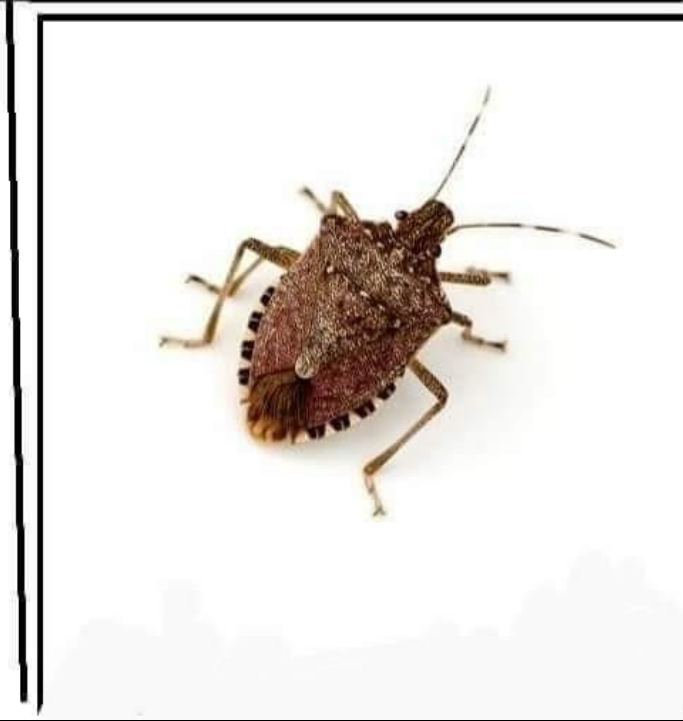
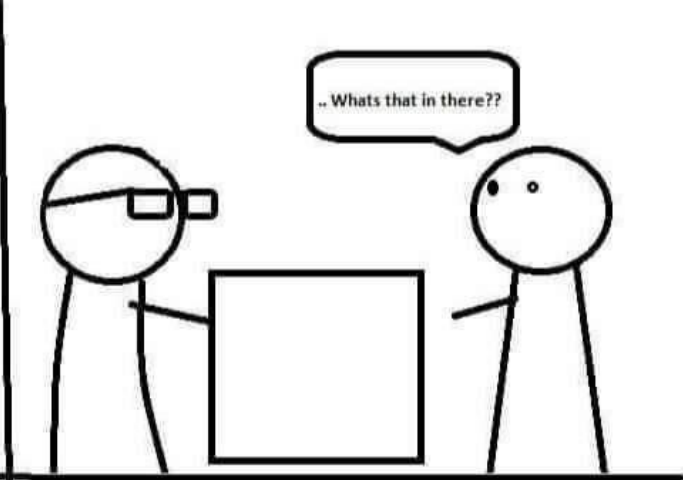
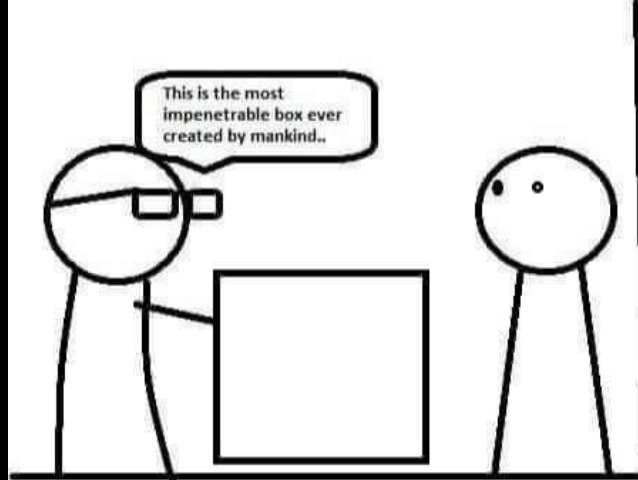
By adding or removing shelter, we can degrade pests' habitat and improve beneficials' habitat.



IPM Implications – Exclusion

We can manage
pests by excluding
them from shelter.





Community IPM

Bed Bug Management—One Step at a Time! Step 2: Get Rid of Clutter

Matthew Frye, New York State Integrated Pest Management Program, Cornell University

1 Bed bugs hide in clutter.



2 Put everything washable in heavy-duty garbage bags.



3 Don't overfill—bugs could escape if bags tear open.



4 Close bags with a knot, then ...



5 ... seal with duct tape.



6 Say no to clutter near the bed.



7 Now your room is clutter free—keep it that way!



The next step is Vacuum Here, There, Everywhere.



Cornell University
Cooperative Extension



New York State
Integrated Pest Management
Program

Produced by the New York State Integrated Pest Management Program, which is funded through Cornell University, Cornell Cooperative Extension, the New York State Department of Agriculture and Markets, the New York State Department of Environmental Conservation, and USDA-NIFA. Illustration and design by Karen English, New York State IPM Program. Cornell Cooperative Extension provides equal program and employment opportunities. © 2013 Cornell University and the New York State IPM Program. Posted 9/2013 at www.nysipm.cornell.edu/factsheets/building/bb_mgmt_steps/clutter.pdf



For more information, see: *What's Bugging You? Bed Bugs*



See all Steps in this series: *Bed Bug Management—One Step at a Time!*

IPM Implications – Declutter

Habitat

- Food
- Water
- Cover/Shelter
- Space





Space



Space

**Weeds are the result of poor turf, not
the cause of poor turf.**

- Randy Prostak, UMass Extension



Space or lack thereof

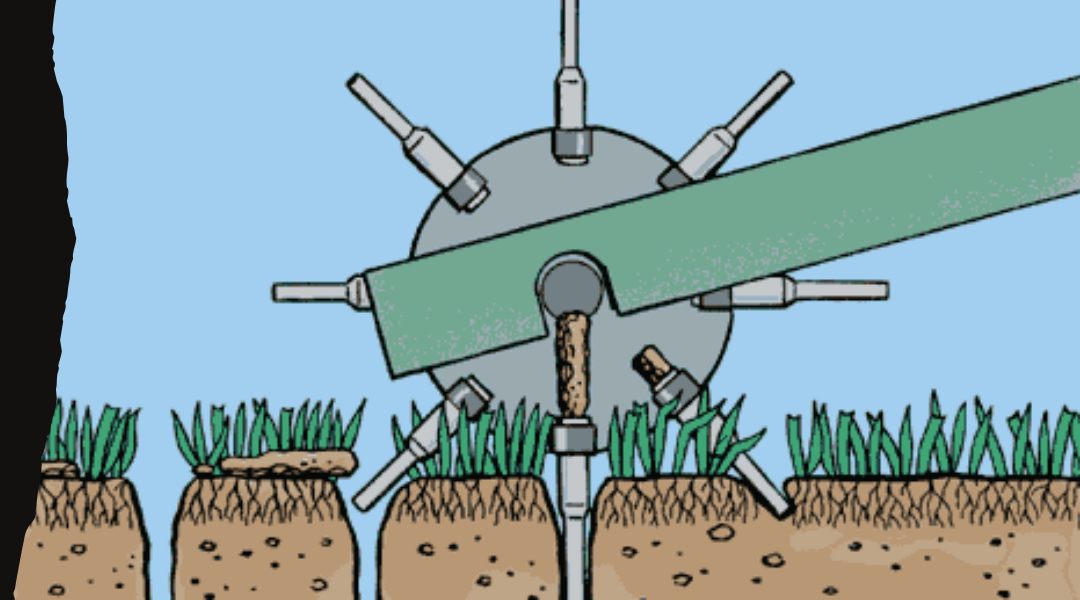
Paul Buckowski /Times Union



Space or lack thereof

IPM Implications - Cultivate

- Cultivating Benefits:
 - Remediate compacted soils
 - Aid in overseeding
 - Help manage thatch
- Examples:
 - Coring
 - Spiking
 - Slicing
 - Drilling
 - Vertical mowing
 - Injecting water





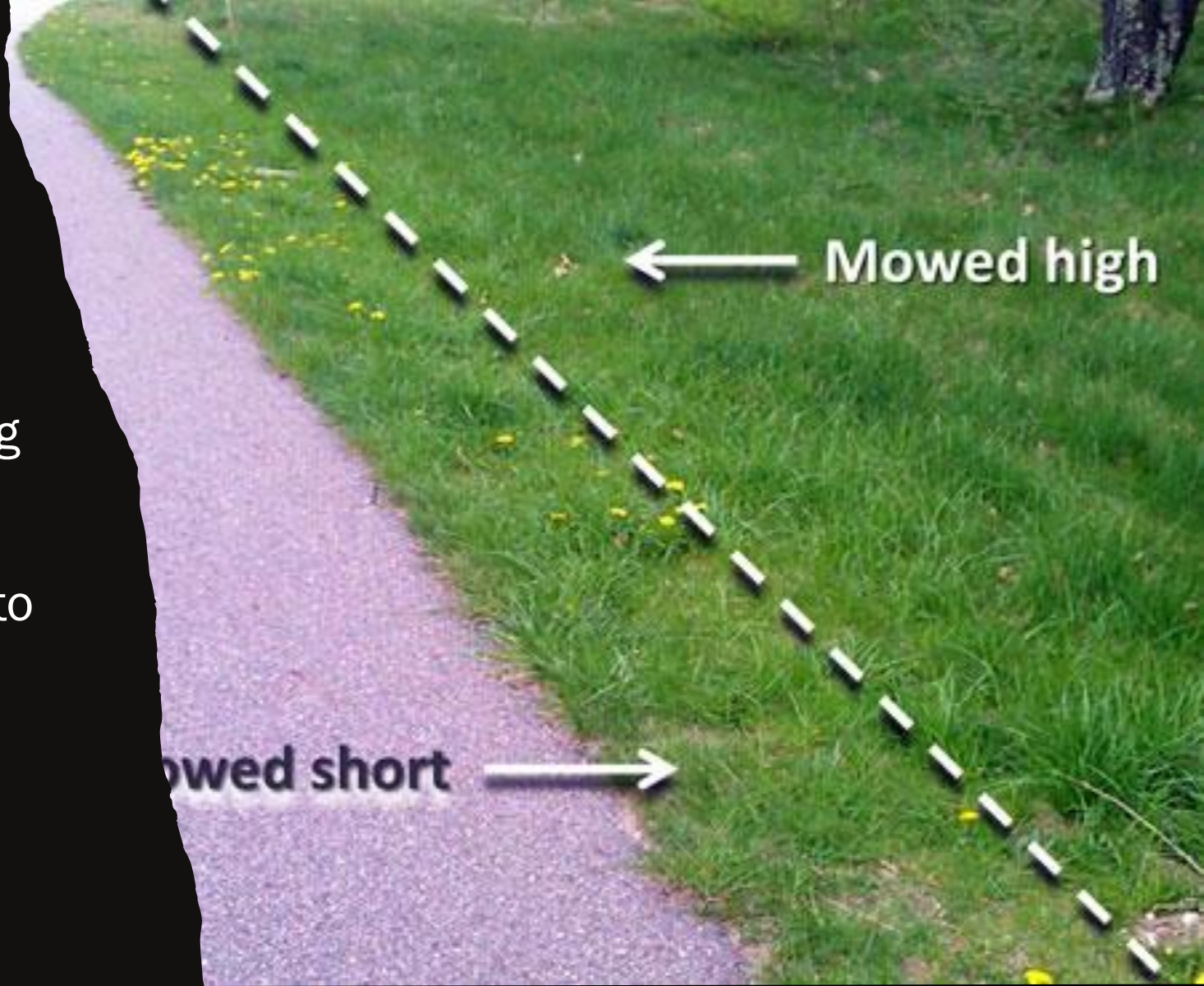
IPM Implications – Exclusion

**Additional
Needs -
Sunlight**



Sunlight

Raising mowing heights decreases the light available to weeds.





**Additional
Needs – Air**

A wide-angle photograph of a lush green field, possibly a meadow or a large lawn, stretching towards a dense line of trees in the distance. The sky is overcast and grey. The field is the dominant feature, with varying shades of green. The trees in the background are dark green and appear to be a mix of deciduous and coniferous species.

IPM Implications

By carefully considering the habitat needs of the landscape and the existing and potential pests, we can put cultural practices into place to benefit plants and discourage pests.

Maintained turfgrass provides habitat for:

- Algae, Annual Bluegrass, Annual Bluegrass Weevils, Ants, Armyworms, Asiatic Garden Beetle, Barnyardgrass, Basal Rot Anthracnose, Black Cutworm, Black Medic, Black Turfgrass Ataenius, Bluegrass Billbug, Broadleaf Plantain, Brown Patch, Buckhorn Plantain, Canada Geese, Chickweed, Cinch Bugs, Clover, Common Blue Violet, Common Chickweed, Cool Season Pythium, Corn Speedwell, Creeping Speedwell, Crows, Daisies, Dandelion, Dollar Spot, Earthworms, European Chafer, Fairy Ring, Fall Leaf Blight, Fall Leaf Spot, Foliar Anthracnose, Fusarium Spp., Goosegrass, Gray Snow Mold, Green June Beetle, Ground Ivy, Hairy Chinch Bug, Hawkweed, Henbit, Japanese Beetles, Knotweed, Lanzia Spp., Large Crabgrass, Moles, Moss, Mouse-ear Chickweed, Necrotic Ring Spot, Necrotic Ring Spot, Nimblewill, Northern Masked Chafer, Opossum, Oriental Beetle, Pink Patch, Pink Snow Mold, Plantain, Powdery Mildew, Prostrate Spurge, Pythium Blight, Quackgrass, Rabbits, Raccoons, Red Thread, Robins, Rusts, Sheep Sorrel, Skunks, Smooth Crabgrass, Sod Webworms, Spring Leaf Blight, Spring Leaf Spot, Squirrels, Starlings, Sting Nematodes, Stripe Smut, Summer Leaf Spot, Summer Patch, Take-all Patch, Voles, White Clover, Yellow Nutsedge, Yellow Patch, Yellow Woodsorrel



Pest habitat

- You built it.
- They came.



Ecology 101

- A **Species'** address is its habitat; consists of:
 - Food
 - Water
 - Shelter
 - Space
- Each **Population** has a **Carrying Capacity** for a given area

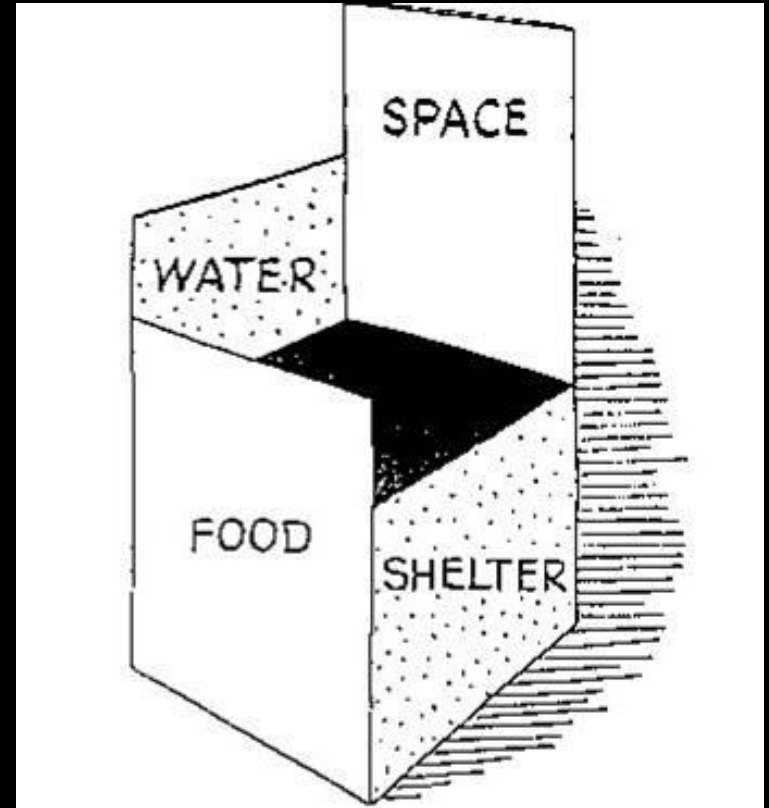
Ecology 101 - Carrying Capacity

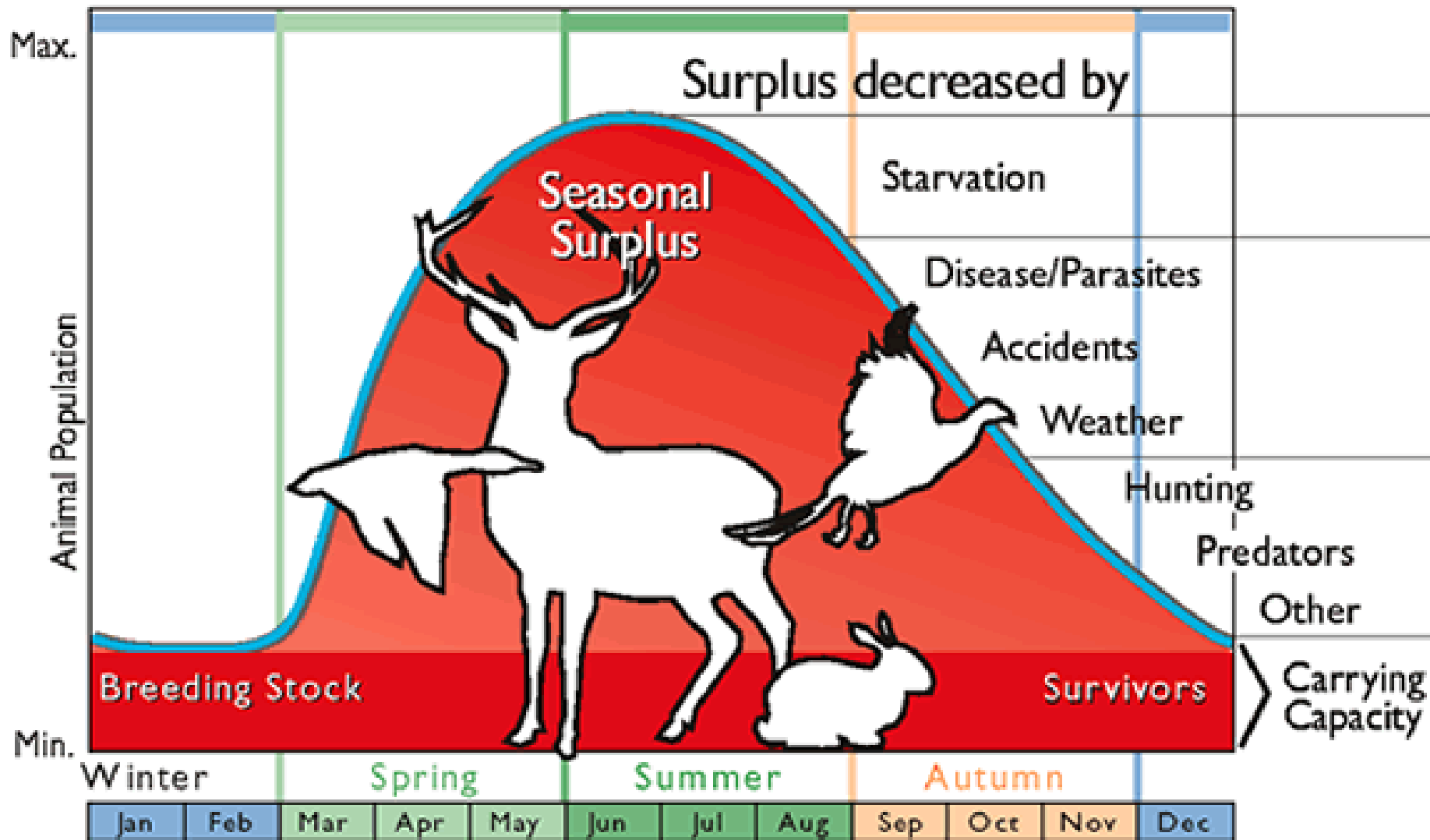
- The number of individuals a given area of land or water can support over time.
- The barrel represents available habitat.
- The water represents the number of individuals.



Carrying Capacity

- Limiting Factor - the least available habitat component
- Increase food, water, or space – no long term affect
- Increase shelter, increase carrying capacity





Pest Pressure Effects

Reduced pressure
from natural
enemies permits
shift from defense to
growth &
reproduction



**Attract or
Introduce
Predators**



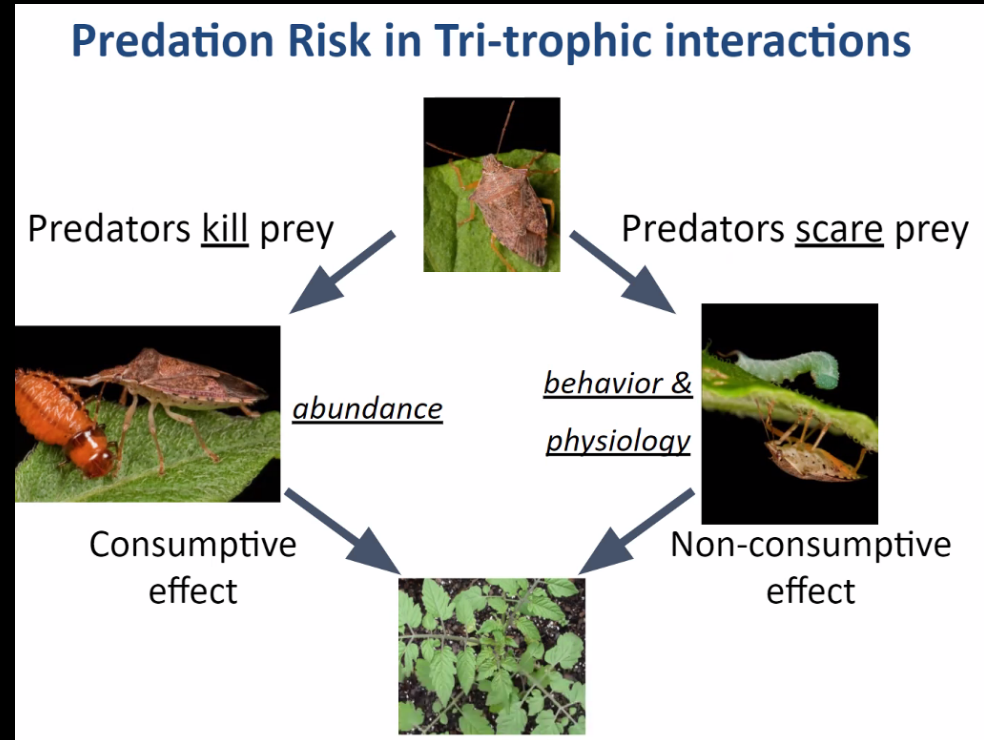
IP

Predators don't even need to kill!

Fear as a Biological Control? How Scaring Farm and Garden Pests Could Lessen Plant Damage

Jennifer Thaler and
Nicholas Aflitto

NYSIPM Academic Seminar
Series





Predators don't even need to kill!



Predators don't even need to real!

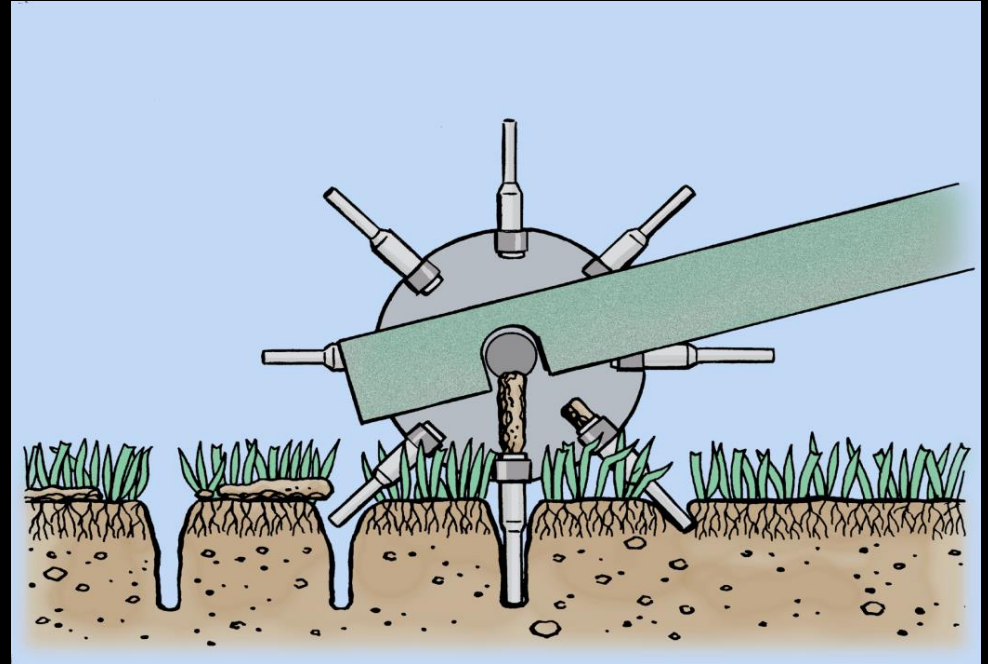
Introduce Disease or Parasites

Entomopathogenic
Nematodes



Decrease shelter and space

- Reduce Thatch
 - adjust pH
 - proper fertilization
 - core cultivate
 - topdress



Cause Starvation

Avoid excess
nitrogen.





Increase Competition

- >4 lbs./1,000 ft² Perennial Ryegrass
- Broadcast Weekly during playing season



**Increase Competition
– Cover Crop**

Managing our homes and landscapes

Managing plants, animals, and fungi that are attracted to homes, turf, gardens, and landscaping



Dealing with pests

- Dealing with pests = Integrated Pest Management
- The key is to know:
 - What pest you are dealing with
 - What are the pest's habitat needs



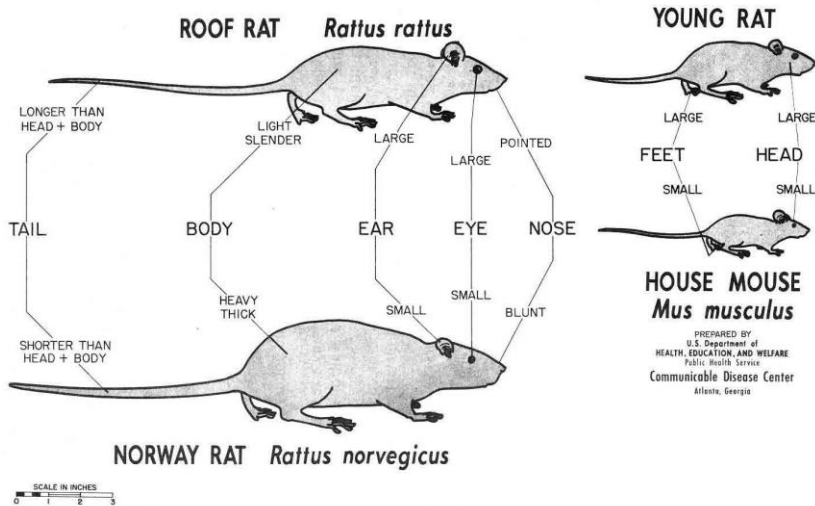
Dealing with pests

- Several methods are used to control undesirable plants and animals
 - Habitat Manipulation
 - Direct influence on individual or population





FIELD IDENTIFICATION OF DOMESTIC RODENTS



Rodents inside and around buildings

Norway rats, house mice and white-footed mice are all very different

Rats and mice are very different

- Mice are curious and not hard to catch.
- Breed much faster than rats, high populations.
- Nest in warm places, like walls around heating.
- Mice can climb well.



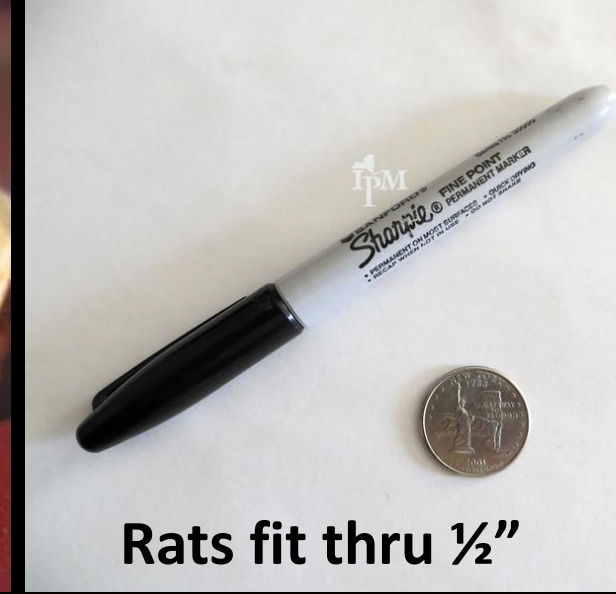
Rats and mice are very different

- Rats are cautious and smart – they avoid traps and bait.
- Rats prefer to burrow in soil under things.
- Rats can swim well.



How do rodents get in?

Rodents can fit through openings that are large enough for the skull to pass through



Rats fit thru ½”



Mice fit thru ¼”

How are they getting indoors?

- Clues
 - Droppings
 - Sebum trails
 - Trails



NYS IPM Program Resources

- Beasts Begone!

Beasts Begone! Handling Wildlife Problems in Buildings

by Lynn Braband, New York State
Integrated Pest Management Program



Tips for trapping

- No license needed to use a rodent trap.
- Bait with rodent-friendly foods, bacon or fish for rats, sweets (Nutella) for mice. Compliment their diet.
- Rodents follow lines – look for pathways along walls and objects.
- Trap triggers placed along walls and vertical surfaces or back to back along the wall.



Reasons for avoiding rodenticides

- Unintentional poisonings
 - Rodents often move and store food, including rodenticides. (lockers)
 - Dying rodents are easy prey for predators, sometimes causing illness to them – hawks, owls, cats
- Tend to die in inaccessible places (walls) and cause unpleasant odors.
- Dead rodents attract secondary pests.

NYS IPM Program Resources

- YouTube Channel
- Playlists
 - Various pests and topics
 - What's Bugging You? First Fridays

Tips for using Snap Traps

NYS IPM Program Resources

- Fact sheets

Community IPM

House Centipedes: Lots of Legs, but not a Hundred

House centipedes are predatory arthropods that can be found both indoors and outdoors. They prefer damp places, including basements, bathrooms and even pots of over-watered plants, where they feed on insects and spiders. As predators of other arthropods, they can be considered a beneficial organism, but are most often considered a nuisance pest when present in the home.

Did you know ... ?

- **By the Numbers:** There are approximately 8,000 species of centipedes.
- **Form-ally Speaking:** Centipedes come in a variety of forms and sizes. Depending on the species they can be red, brown, black, white, orange, or yellow. Some species are shorter than an inch, while tropical species can be up to a foot in length!
- **Preying on the Predators:** Larger centipedes can feed on mice, toads, and even birds.
- **Preference or Requirement?** Centipedes prefer moist areas because they lack a waxy exoskeleton. In dry areas, centipedes can die from desiccation or drying out.

Identification

Adult house centipedes measure one to two inches in length, but may appear larger because of their 15 pair of long legs. House centipedes are yellow-gray in color, with three black stripes that span the length of the body, and black bands on their legs. The last pair of legs is very long and is modified to hold onto prey items. These and other legs can be detached defensively if grasped by a predator. House centipedes hunt with their large compound eyes, are fast runners, and are adept at staying hidden.

Biology

As a group, centipedes are highly predaceous arthropods that are most active at night. They are able to squeeze through narrow openings to enter structures, while numerous legs provide speed to chase down prey. They capture smaller arthropods with their hind legs and inject venom to subdue their prey. House centipedes are said to have weak mandibles, but can pierce the skin and inject venom when handled roughly by humans. Bites are said to feel like a bee sting, causing minor swelling and irritation.



Common House Centipede (*Scutigera colophrata* Linnaeus). Photo: G. Alpert.



Common House Centipede close-up. Photo: G. Alpert.



A two-foot wide vegetation free zone around buildings can reduce moisture problems. Photo: M. Frye

Community IPM

How to Prevent the Buzz – Sting – Ouch! of Bald-Faced Hornets

Bald-faced hornets are social, stinging insects related to yellow jackets that house their colonies in large, enclosed carton nests. During summer months, these arthropods serve an important role as predators of flies, caterpillars and other soft-bodied insects to keep their numbers in balance. However, because of their ability to sting and a propensity to defend the nest, bald-faced hornets represent a public health concern when they live near humans.

Identification

Worker bald-faced hornets can be identified by the large patch of white on their face, which serves as the basis of their common name. The abdomen is mostly black with white markings at the posterior tip. This hornet is the largest yellow jacket species in North America (at least 0.6 inches long), and can build nests containing hundreds of individuals. The single queen resides deep inside the nest, and is protected by a group of workers.

Biology

Bald-faced hornets are common in both wooded and urban areas in the Northeast. The overwintered queen starts a new nest in the spring when the weather warms, typically late April or May. The queen scrapes loose bark with her mandibles and mixes it with saliva to form a smooth carton, which will hang from a tree, bush, low vegetation or occasionally on a building. This is the start of a small nest where the queen will lay eggs and take care of the resulting larvae until they pupate. The resulting workers will expand the size of the nest throughout the season as the queen continues to reproduce. At the end of the summer, the nest may be larger than a basketball.

Inside the carton are horizontal layers of comb divided into circular platforms. The outer carton layer is very thin, and can be easily stripped away if the nest is damaged. Animals or humans that disturb the nest can be attacked by a large number of aggressive wasps. Their stinger is not barbed, and each hornet can deliver multiple stings. Venom injected by the stinger is what makes a bald-faced hornet sting painful. Once a victim is stung, the best response is to leave the area as quickly as possible. Multiple stings often occur close to a nest.

In nature, bald-faced hornet workers are considered beneficial because they capture caterpillars and other insects, and bring them to the nest to feed the larvae.



Bald-Faced Hornet Queen *Dolichovespula maculata*




Mature nest.



In Summary:

- The yard, garden, school, business, community is part of a larger whole.
- Each part is connected to every other part.
- Understanding the parts will lead to greater management choices and successes.
- Keep learning!
- Keep asking good questions!
- Be creative!



The real voyage of
discovery consists
not in seeking
new lands, but in
seeing with new
eyes.

Marcel Proust



flickr



You**Tube**

Instagram

 **IPM** New York State
Integrated Pest Management
Program

part of  Cornell University
Cooperative Extension