Hartford Conservation Commission

Bugs! They make our skin crawl; they play starring roles in reality TV shows and horror flicks; they bite us and eat our gardens. What good are they? This year, Hartford Conservation Commission wants to change the way you think about bugs — and gardening — because the truth is…most insects are good and we CAN'T live without them.

They are the "little things that run the world" (E.O Wilson).

We also want to share an exciting new project by Vermont Center for Ecostudies (VCE): The Vermont Atlas of Life. It began with a question, Q. How many species occur in Vermont?

A. No one really knows...

VCE's goal is to inventory every living thing in Vermont and they want everyone to help. To learn more, visit: http://www.inaturalist.org/projects/vermont-atlas-of-life

2013 HCC Events Calendar

April 20, Saturday	Vernal Pool Salamander Walk, Fun for families! (sorry- no dogs). 10:00 a.m. — noon, Hartford Town Forest (HTF) *
April 30–May 7	Green-Up Hartford Days, green-up bags available at Municipal Office*
May 4, Saturday	Green-Up Day/Arbor Day Celebration, 9:00 a.m. — noon, Lyman Point Park. Green up bags, tree and shrub sale
June 1, Saturday	Household Hazardous Waste Collection, 9:00 a.m. — noon, Hartford Recycling Center
June 2, Sunday	Trails Day, 9:00 a.m. — noon, Hartford Town Forest*
Sept. 28, Saturday	Invasive Plant Identification and Removal Workshop, 9:00 a.m. — noon, Hurricane Forest Wildlife Refuge*
Feb. TBA, 2014	Wildlife Tracking Snowshoe, Hartford Town Forest*

HCC members: Jon Bouton (Chair), Karen Douville, Kevin French, Mary Hutchins, Shawn Kelley, and Jim Peters.

We meet the first Monday of the month, 7:00 p.m. at the Municipal Bld. We are seeking a new member; please contact Matt Osborn if you are interested.

* Contact Matt Osborn for information 295-3075, mosborn@hartford-vt.org

Swallowtail Butterflies


1


2


3


4

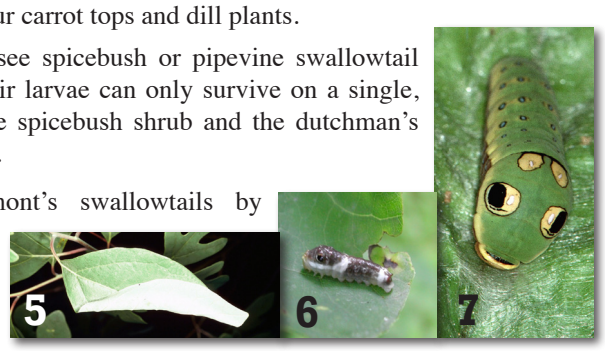
This year we are focusing on bugs. There are roughly 900,000 known insect species worldwide, that's approximately 80% of all animal species. We do not have the space to talk about all of these species so we decided to focus our attention to one group, the swallowtail butterflies. In North America there are over 700 butterfly species and over 11,000 moth species. Swallowtail butterflies are members of the Lepidoptera (lep-i-DOP-tər-ə) order of insects. Lepidoptera includes all butterflies and moths, and they represent roughly 20% of all insects species worldwide.

Vermont boasts five species of swallowtail butterfly. We're most likely to encounter the Eastern tiger or the similar and slightly smaller Canadian tiger swallowtails because their larvae (caterpillars) can eat many different plants — called host plants — common in our forests (see table below).

If you're a vegetable gardener you may also see the black swallowtail butterfly and you've probably noticed its colorful green, black, and yellow larvae munching away on your carrot tops and dill plants.

You're less likely to see spicebush or pipevine swallowtail butterflies because their larvae can only survive on a single, specific host plant, the spicebush shrub and the dutchman's pipe vine, respectively.

You can help Vermont's swallowtails by providing their host plants in your home garden.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Photos	Swallowtail Butterflies	Host Plant(s)
1	Pipevine Swallowtail *(Battus philenor)*	Dutchman's pipe *(Aristolochia durior)*
2	Black Swallowtail *(Papilio polyxenes)*	Carrot family *(Apiaceae)*
3	Eastern tiger Swallowtail *(Papilio glaucus)*	Basswood *(Tilia americana)* Birches *(Betula)* Black cherry *(Prunus serotina)* Willows *(Salix)*
4	Spicebush Swallowtail *(Papilio troilus)*	Spicebush *(Lindera benzoin)*

Fun Facts about the Spicebush Swallowtail

- Females will only lay their eggs on spicebush shrubs.
- Development from egg to adult takes about a month.
- Larvae (caterpillars) stay on the leaf where they were laid.
- Larvae live in a rolled-up leaf, held together with silk.
- They stay rolled up during the day and feed at night, (see **photo 5**).
- Adults (butterflies) live between two days to two weeks, depending on food and predation.
- Adult wingspan ranges from 3-4 inches and they fly closer to the ground instead of high in the air.
- Birds, spiders, and dragonflies all try to eat adults and larvae.
- Larvae and adults employ mimicry to avoid predation.
- Young larvae, shown in **photo 6**, resemble bird droppings.
- Older larvae, shown in **photo 7**, look like the bird-eating tree snakes of Central America. Our migratory birds that winter in Central America recognize the larvae as tree snakes and stay away.
- Adults mimic the pipevine swallowtail, a terrible tasting butterfly.
- To transform from larvae to butterfly, the larvae pupate by forming a chrysalis made of a hardened protein.
- 2 generations occur each year.
- Larvae that mature in the fall remain in their chrysalides all winter and emerge as butterflies in April.

Photo credits: Bugwood.org; 1 & 2. Sturgis McKeever, Georgia Southern University; 3. Edward L. Manigault, Clemson University Donated Collection; 4. Ronald F. Billings, Texas Forest Service; 5. Lacy L. Hyche, Auburn University; 6. Pennsylvania Department of Conservation and Natural Resources - Forestry Archive; 7. Jerry A. Payne, USDA Agricultural Research Service

BUGS!

According to Douglas Tallamy, only 1% of the insects on earth harm humans. The remaining 99%:

- pollinate plants
- recycle nutrients from dead plants and animals back to the soil
- control plant-eating insect populations
- aerate and enrich the soil
- provide food either directly or indirectly for most animals on earth

Dr. Tallamy is professor and chair of the Department of Entomology and Wildlife Ecology, at the University of Delaware in Newark. He studies native plants and their role supporting healthy populations of insects and why this connection is so important for all terrestrial animal life on the planet. He is also the author of the book *Bringing Nature Home*, the Garden Writers Association of America 2008 Silver Medal Award winner.

Bringing Nature Home

Bringing Nature Home describes the observations that led to his current scientific research. It all started when he purchased 10 acres in rural Pennsylvania in 2000…

The land had been farmed for centuries, then abandoned and had regrown into shrubs and trees. To his dismay, many of the plants on his property were invasive species. In fact, being a scientist, he counted them and discovered that at least 35% were aggressive alien (from other continents) plant species that were quickly replacing the native plants.

He set himself an ambitious and arduous task — to eradicate all the alien plants on his property and replace them with native plants. Now Dr. Tallamy is an entomologist, he studies bugs, so as he was removing the alien plants he made observations that the average homeowner might miss about bugs and their behavior. Dr. Tallamy noted,

"Early on in my assault on the aliens [plants] in our yard, I noticed a rather striking pattern. The alien plants that were taking over the land — the multiflora roses, the autumn olives, the oriental bittersweets, the Japanese honeysuckles, the Bradford pears, the Norway maples, the mile-a-minute weeds — all had very little or no leaf damage from insects, while the red maples, black and pin oaks, black cherries, black gums, black walnuts, and black willows had obviously supplied many insects with food."

Male common yellowthroat warbler bringing caterpillars to the nest; both males and females feed the chicks.

Native vs. Alien Plants

Dr. Tallamy's observations — that more alien plants meant fewer native insects — led to other questions:

- ***Are all alien plants harmful to our native insects?***
- ***How much are native insect populations changing?***
- ***What is the impact on birds and other wildlife?***

He and his colleagues have started to address some of these questions with large, controlled research projects.

Preliminary data are in — and whatever we think of bugs — we need them in our gardens, yards, and forests.

One of his first studies was to compare the total number of insects and their weight from the four most common native plants and the five most common alien plants in his yard. He discovered native plants support:

- ***three times more total insect species than alien plants***
- ***four times more total insect weight than alien plants***

He then compared just the number of caterpillars on native vs. alien plants, looking at their production of Lepidoptera (moth and butterfly) caterpillars and sawfly caterpillars (combined, they provide the largest part of insect-eating birds' diet). His results showed:

- ***native plants support 35 times more caterpillars (by weight) than alien plants***

Alien Plants' Impact on Wildlife

Dr. Tallamy first looked at birds, specifically a Common Yellowthroat warbler, male shown at left. It's one of the colorful Neo-tropical songbirds (species that migrate every fall to Central or South America) that return to North America to nest, lay eggs, and raise their young. Most of these songbirds rely on insect protein and fat to provide the nutrition they need to:

- produce eggs
- provide the energy needed when feeding their young
- to feed the baby birds (most important)

He watched a female foraging to feed her young; she carried an insect to the nest every 5 minutes for a total of 156 trips a day, That's a long-13 hour day of non-stop foraging to feed her baby birds. Dr. Tallamy concludes, "She can't forage any harder."

According to scientific studies most bird populations are limited by their food supply. If there is 35% less food available there will be 35% less birds (by weight). Neo-tropical songbirds such as warblers, orioles, and thrushes have declined an average of 1%/year since 1966. In the last 50 years that's close to a 50% reduction in population sizes for these birds. Can this reduction be due to our use of alien plants in landscaping?

Many Animals Depend on Insect Protein

- All spiders eat insects (or they eat other spiders that eat insects)
- Frogs and toads eat insects (they're eaten by birds, snakes, otters)
- Salamanders eat insects (they're eaten by fish, snakes)
- Moles and voles eat insects (they're eaten by hawks, foxes, weasels)
- Bats eat insects (they're eaten by hawks, owls, weasels)
- Mice prefer insects (they're eaten by many other animals)
- Foxes eat insects (they're eaten by coyotes, catamounts, eagles)
- Black bear eat insects (23% of its diet is insects)

Insects are essential for many wildlife species

Landscaping for Wildlife

From a gardener's perspective: a plant that doesn't get eaten by bugs seems like a wonderful idea, the perfect ornamental plant. The horticultural trade industry agrees, if you go into almost any nursery, garden center, or peruse any garden catalog most of the plants for sale will be alien plants because they're "pest free"— their foliage is not eaten.

From wildlife's perspective: most of our ornamental plantings are not providing food for our insects — required either directly or indirectly for most wildlife species.

Many commercial landscapers and private homeowners landscape with large lawns and beautiful plantings but when you take a closer look you'll notice that every plant is an alien plant species. This common scenario is repeating itself, backyard-by-backyard and subdivision-by-subdivision all across the U.S. (see photo A).

If we want to continue to see wildlife we need to rethink the way we landscape, we need to:

- Incorporate more native plants. When we landscape with alien plants we're replacing the native plants that provided a primary food source — insects — with alien plants that reduce the total amount of food available for our birds and other wildlife.
- Reduce the amount of mowed lawn. Most lawn grasses are made up of alien grass species, but even if your lawn area is composed of native plants, a weekly mowing will kill most caterpillars using those plants.

Photo A: home with massive lawn, few trees, and alien ornamental shrubs that provide very little habitat for birds, butterflies, and other wildlife. Photo B: home provides native plants for wildlife.

Humans and Wildlife Habitat

Humans have been impacting the landscape for centuries and in the early years, this was less of a problem – wildlife could move around the poor habitat we created. This is no longer the case; consider how humans have changed the land in the lower 48 states:

- We develop land at an alarming rate, 2 million acres (1/3 the size of Vermont) were converted by development every year between 1982 and 1997, and this trend is accelerating.
- Approximately 43,480 square miles are paved with roads, parking lots, and driveways — providing ZERO wildlife habit (that's 4.5 times the size of Vermont or more than the area of VT, NH, MA, CT, RI combined).
- Nearly 62,500 square miles (40 million acres) have been converted to lawns — only a little better than pavement for wildlife (that's 6.5 times the size of Vermont or more than VT, NH, MA, CT, RI, NJ, DE, MD combined).

Fortunately, in Vermont, we still have a fair amount of wildlife habitat — but Vermont is not immune.

- Most developments and subdivisions in the state look like those in Anytown, USA; wildlife habitat has been replaced with lawn and alien ornamental plants.
- The Vermont Forum on Sprawl reports that, "the rate of development in Vermont is 2.5 times greater than the rate of population growth. Much of this development appears to be dispersed in rural and suburban areas rather than within existing village and urban communities, claiming land that supports fish, wildlife, and natural systems."

Today, the combined acreage of our protected areas, national parks, refuges, and woodlots does not provide enough habitat to sustain wildlife diversity — because they are not connected. They are separated by human development that provides very little, or no, wildlife habitat.

The GOOD News...

We can create more habitat for wildlife — in just a few short growing seasons — if we modify the way our existing developed areas (our homes, businesses, condos, and subdivisions) are landscaped, by:

- providing the native plants that our wildlife need. See HCC page 4 for a table of recommended plant species.
- reducing lawn area by planting a variety of native tress, shrubs, and ground covers that will provide food, shelter, and nesting/denning sites for wildlife (see photo B).
- removing alien plants that do not provide the high quality and quantity of food for our wildlife, especially invasive species.

If we replant half of the approximately 40 million acres that we now have in lawn (and these areas are connected)— we can create more wildlife habitat than provided by all of the following parks combined:

- Adirondack
- Yellowstone
- Yosemite
- Grand Teton
- Canyonlands
- Mount Rainier
- North Cascades
- Badlands
- Olympic
- Sequoia
- Grand Canyon
- Denali
- Great Smoky Mountains

If you add up all these national parks it is still less than 20 million acres.

Photo credits: D. Tallamy

CONSERVATION

Plants That Provide The Most Caterpillars For Birds And Other Wildlife

Insects are Fussy Eaters

Nearly all (90%) of our plant-eating insects are specialists — they can only eat specific plants. Why? All plant species have unique leaf chemistries and are composed of different chemical compounds (common examples include glycosides, phenols, terpenes, and alkaloids). It is thought the chemicals act as the plants' defense mechanism to keep insects from eating their leaves.

Our native plants and insects co-evolved over millions of years. During this time insects developed enzymes and adaptions to detoxify the poisonous chemical compounds found in specific plants. For example, today the Monarch butterfly larvae can digest the toxic cardenolides found in milkweeds (plants that are poisonous to most species of insects). However the Monarch caterpillar is now so specialized it can ONLY eat milkweed plants and nothing else.

No milkweed plants = no Monarch Butterflies

Native Plants are *NOT* Created Equal

According to Dr. Tallamy, "A plant that has fed nothing has not done its job." Research has shown that some native plants support far more caterpillars than others. Use the table on this page to compare different trees, shrubs, and plants.

If you want to increase the amount of food for birds (and other wildlife) and have room for only one tree, a native oak tree supports a whopping 532 species of Lepidopteron. If you don't have room for a tree, incorporating smaller native plants in your garden will also be beneficial.

If you have more room consider removing a portion of your lawn and replanting with a mix of native trees, shrubs, and plants. Start small; perhaps remove the portion of lawn you only visit when you mow. If the area you replant abuts a neighbor's property and they incorporate native plants as well, the birds will have a much easier time finding insects to raise their young.

You can't run a supermarket on just bread, and you can't run an ecosystem on just lawn… Lawns and foundation plantings are a lot simpler than the wild places they replace" (Stein, 1995)

Better Butterfly Gardens

To make more butterflies we need to provide the host plants that Lepidopteron larvae (butterfly and moth caterpillars) can eat. The popular butterfly bush is an alien and invasive plant; it provides nectar but only supports one species of Lepidoptera.

The native plants and shrubs listed in the table at right, provide:

- beautiful flowers for gardeners
- nectar for butterflies
- tasty foliage for caterpillars

Want to learn more?

Materials on HCC pages 2-4 are from *Bringing Nature Home,* Dr. Tallamy's lecture, or his plant lists. More information can be found in the following locations:

- *Bringing Nature Home* is available at the Hartford, Wilder, and Quechee Village libraries & the Hartford High School Library
- Dr. Tallamy is an entertaining speaker; a video of his talk can be found at: http://bit.ly/VT1vi4
- His complete plant list will be posted on the HCC link: http://www.hartford-vt.org/content/conservation/

Native Host Plants		Lepidoptera species supported
Trees		
Oak	*Quercus*	532
Chokecherry Cherry, Peach	*Prunus*	456
Willow	*Salix*	455
Birch	*Betula*	411
Aspen, Poplar	*Populus*	367
Maple (not Norway)	*Acer (not A. platanoides)*	297
Alder	*Alnus*	255
Hickory	*Carya*	235
Elm	*Ulmus americana*	215
Pine	*Pinus*	201
Spruce	*Picea*	150
Basswood	*Tilia*	149
Hazelnut	*Corylus*	131
Butternut, Walnut	*Juglans*	129
Chestnut	*Castanea*	127
Beech	*Fagus*	127
Serviceberry	*Amelanchier*	124
Tamarack	*Larix*	121
Mountain Ash	*Sorbus decora*	68
Flowering Plants		
Aster	*Aster novae-angliae*	109
Sunflower	*Helianthus spp.*	75
Joe-Pye weed	*Eupatorium fistulosum*	41
Morning glory	*Ipomoea spp.*	39
Violet	*Viola spp.*	30
Geranium	*Geranium maculatum L.*	24
Sweet Pea	*Lathyrus spp.*	21
False indigo	*Baptisia australis*	17
Iris	*Iris virginica*	16
Black-Eyed Susan	*Rudbeckia hirta L.*	16
Butterfly weed	*Asclepias tuberosa*	12
Impatiens	*Impatiens spp.*	12
Verbena	*Verbena bonariensis*	11
Lily	*Lilium superbum L.*	11
Phlox	*Phlox paniculata*	8
Beebalm	*Monarda didyma*	7
Flowering Shrubs		
Blueberry	*Vaccinium pallidum*	294
Hawthorn	*Crataegus crus-galli*	168
Rose	*Rosa carolina*	135
Viburnum	*Viburnum ss.* (native)	104
Witchhazel	*Hamamelis virginiana*	63
Rhododendron, Azalea	*Rhododendron* (native)	51
New Jersey tea	*Ceanothus americana*	45
Elderberry	*Sambucus canadensis*	42
Ninebark	*Physocarpus*	41
Buttonbush	*Cephalanthus*	19
Mountain laurel Sheep laurel	*Kalmia latifolia* *Kalmia angustifolia L.*	33
Bearberry	*Arctostaphylos uva-ursi*	17
Spicebush	*Lindera benzoin*	11
Summersweet	*Clethra alnifolia*	10
Hydrangea	*Hydrangea quercifolia*	5