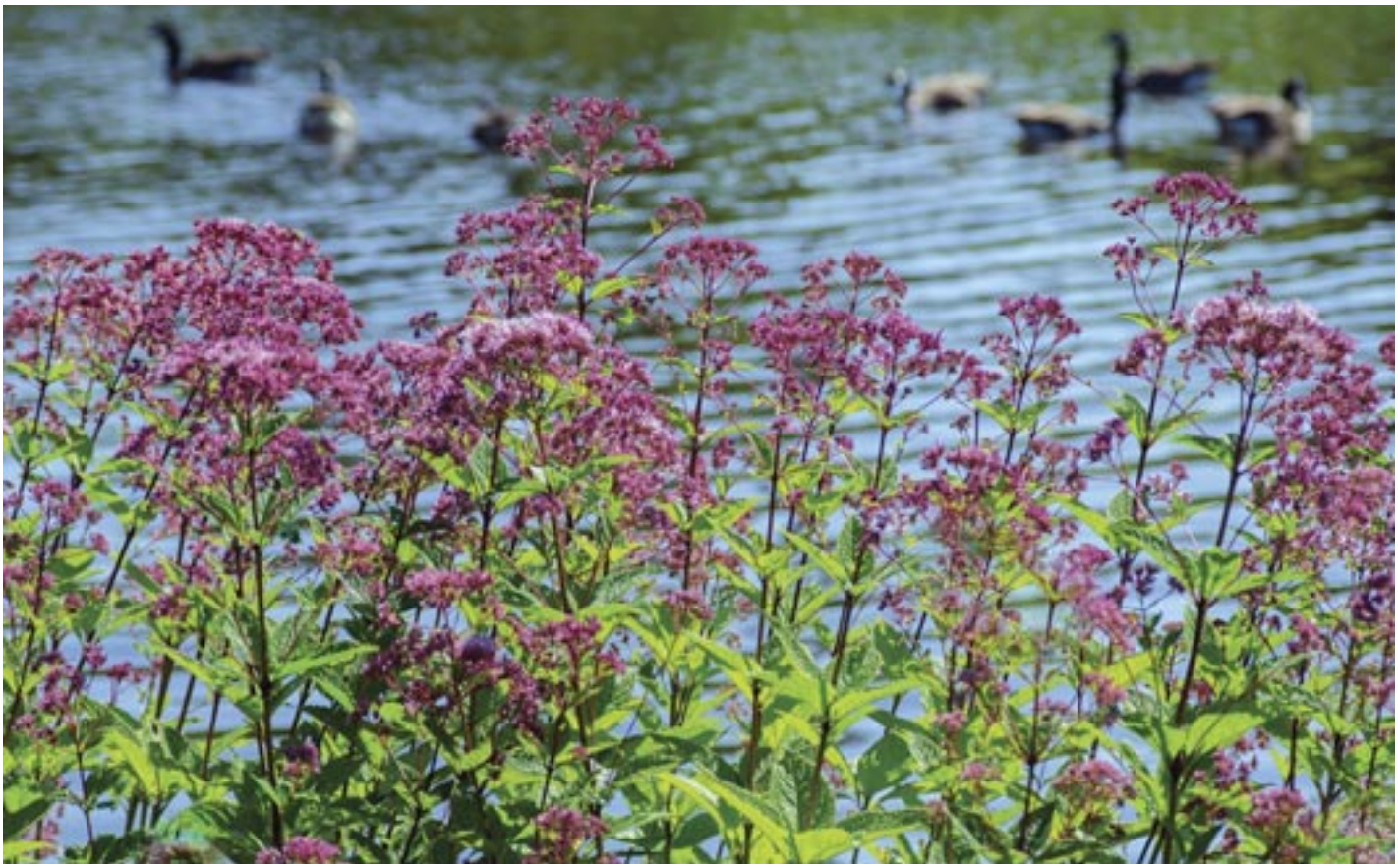

Purple Joe-Pye weed *(Eutrochium purpureum)* bordering a pond in Easton.

# Life with Joe Pye Weed, A Pollinator Feast

**By Christine Cook**

One day, as a child, I spied a curious, dark, almond-shaped jewel hanging from the spigot on the side of the house. Suddenly, the jewel ripped open, and something yellow, streaked with black, emerged.

I watched in awe as splendor itself, an Eastern Tiger Swallowtail butterfly, slowly took a new shape, expanding its drying wings, opening and closing them, again and again. Then, it flew up, its yellow wings merging with the yellow of the late morning sun. I was enthralled.

I did not know, that as an adult, I would design butterfly gardens for 23 years, across Connecticut, as the conservation chairperson of the Connecticut Butterfly Association. I learned, by hiking on field trips, so much from so many knowledgeable members.

I live in Easton, a town where 40% of the land is owned by the local water company. The average Eastonite has no idea what living treasures inhabit these protected lands. And yet, my home is connected to these areas with what it offers and who it serves. Pollinators: butterflies, bees, beetles, flies, moths, ants, wasps, hummingbirds, some mammals, and yes, even some mosquitos are on the move; seeking out what they need for a particular moment of development in their lives.

Some may travel only a few feet, while others may travel miles. When the Red-banded Hairstreak butterfly showed up at a nearby pond, I knew that it laid its eggs on sumacs (*Rhus* spp.). But where were the sumacs? About a quarter of a mile up the road. The "Pollinator Lifecycle Shed" is the broader area that contributes to the diversity, vitality and general health of a particular ecosystem. The connections often go unseen by us mere mortals; but they, and we, are threaded together.

I have roamed and photographed the natural area that surrounds a local school for decades. A woodland consisting of Red Maples *(Acer rubrum)*, Northern Red Oaks *(Quercus rubra)*, Pin Oaks *(Quercus palustris)*, a grand Willow Oak *(Quercus phellos)*, several species of Hickory (*Carya* spp.), Willows (*Salix* spp.) and Eastern White Pines *(Pinus strobus)* surrounds the school. An athletic field with Kentucky Blue Grass *(Poa pratensis)* and clovers (*Trifolium* spp.) is laid like a carpet.

There is a slope at the school that rolls down to a 1/3 acre pond, whose buffer zone is home to: Silky Dogwood *(Swida amomum)*, Elderberry *(Sambucus nigra)*, Lurid Sedge *(Carex lurida)*, Fringed Sedge *(Carex crinita)*, Common Rush *(Juncus effusus)*, Goldenrods (*Solidago* spp.), Jewelweed *(Impatiens capensis)*, Blue Flag Iris *(Iris versicolor)*, Swamp Milkweed *(Asclepias incarnata)*, New York Ironweed *(Vernonia noveboracensis)*, Blue Vervain *(Verbena hastata)* and Boneset *(Eupatorium perfoliatum)*. There are mauve-colored, cloud-like swaths of Spotted Joe Pye weed *(Eutrochium maculatum)*. So pretty! So inviting!

I recently started to examine my photographs and realized that most of

the images were of scores of pollinators nectaring on the big fuzzy heads of the stately Joe Pye weed. I had photographed 28 different species of butterflies, numerous bees, wasps and moths. So much activity, both day and night!

What was it about this plant that attracted so many to linger for hours? I would observe some butterflies who, after about an hour of imbibing, would have to sit down on the ground for a few minutes; perhaps needing a lie down after too much sugar. Then, up they flew to consume more!

A Joe Pye weed flower head is big and has a lot of florets that are maturing at different rates. It can support the weight of a lot of pollinators at one time. Its nectar must be delicious!

Many species of bees visit Joe Pye weed: bumble bees, honey bees, digger bees and leaf-cutter bees, long-horned bees, to name a few. Their mop-like tongues soak up nectar which provides a wonderful carbohydrate resource. The pollen provides protein. By early autumn, the bees feast in a frenzy. I try not to disturb them.

Wasps, with their smooth bodies, are not great pollinators. They feed their young insects, so they don't collect pollen. They actively crawl over the flower heads, around and around, feeding on nectar for energy.

Occasionally, I have seen migrating hummingbirds stop for a sip. They do not linger on any one plant, but investigate the whole colony, travelling quickly back and forth.

Isabella Tiger Moth caterpillars eat Joe Pye weed's leaves. The Three-lined Flower Moth and the Ruby Tiger Moth lay their eggs on it. Amber snails, a favorite food of carnivorous firefly larvae, chew holes too. The Eutrochium Borer Moth eats its roots.

Dragonflies and praying mantises roost among the florets, awaiting a tasty meal – so many distracted and sugar-besotted insects to choose from.

My curiosity about this alluring plant was heightened. And who the heck was Joe Pye?

According to a paper by the Michigan Botanical Club in 2017, Joe Pye, Shauqueathqueat, was a Mohican sachem who lived around Stockbridge, Massachusetts in the late 18th and early 19th centuries. In 1783 George Washington granted safe passage to the tribe to relocate to New York in gratitude for their involvement in the Revolutionary War.

An apocryphal story goes that Joe Pye stayed behind to work for a while. He told the tribe to sprinkle the seeds of a certain medicinal plant (Joe Pye weed), and he would soon come and find them by following the blooms. There is no evidence that Shauqueth-queat ever peddled herbs, especially Joe Pye weed, which was used in the treatment of typhoid fever. How the plant took his name remains a mystery.

"There are four *Eutrochium* species in Connecticut. They often hybridize. They all have leaves that grow in whorls."

There are four *Eutrochium* species in Connecticut. They often hybridize. They all have leaves that grow in whorls. Spotted Joe Pye weed *(Eutrochium maculatum)* has spotted or solid purple stems with deep pink flower heads. Hollow Joe Pye weed *(Eutrochium fistulosum)* can get up to 9 feet tall with pale hollow stems and pale pink flower heads. Purple Joe Pye weed *(Eutrochium purpureum)* has green stems with a bit of purple only at its leaf nodes. Its leaves have the heavenly scent of vanilla. Coastal Joe Pye weed *(Eutrochium dubium)* is a little shorter, growing 2-5 feet tall. All of these species prefer wet feet, but will tolerate drier conditions if given a little shade. Most do best in full sun. They bloom for several weeks from late summer into early autumn.

Joe Pye weed is a member of the Asteraceae family. It only has disc flowers. There are clusters of them in a capitulum or flower head. Each fluffy head is made up of 8 to 20 small florets for pollinators to poke their proboscises and tongues into. Each individual floret is surrounded by overlapping bracts. The style is bifurcated inside a fused tubular corolla and gives Joe Pye weed its fuzzy appearance. The fluffy "floss" of these styles will aid in wind dispersal of the seeds. The seeds are eaten by many birds, including Dark-eyed Juncos, Tufted Titmice, American Goldfinches and Black-capped Chickadees.

Pollinators and flowers have co-evolved to perform services for each other. Flowers have evolved to exhibit beautiful colors; often with ultraviolet nectar guides that only pollinators can see. They exude scents from glands in their petals to further attract pollinators. These clues tell the pollinators that a reward of pollen and nectar awaits.

They ingest the nectar and simultaneously get covered in pollen. By moving from flower to flower to flower they transfer male grains of pollen to the female stigmas of other plants of the same species. The pollen grain germinates and forms a pollen tube for the male sex cells to travel to the ovary, where fertilization occurs. Once fertilized, the mature ovary becomes the fruit, the mature ovule becomes the seed.

Joe Pye weed has a two-stage pollination process. First, the pollen matures inside of a closed corolla. As the flower opens, some pollen is shed onto a non-receptive stigma at the top of the style. The style continues to stretch, pushing the stigma, with random pollen grains on it, upward, making it available.

After a few days, the plant has been visited by many pollinators, and some of the pollen has been removed. At that point, the two stigmas move apart, becoming receptive to the grains of pollen delivered by a pollinator from another Joe Pye weed plant. In this way, Joe Pye weed avoids being pollinated by its own pollen.

A plant's nectary is a gland that secretes nectar through stomata. It may be positioned at the base of a flower's stamens or it may be in the shape of a disc or donut that surrounds the base of a flower's ovary. Occasionally, it can be at the base of a petiole. Plants of the Asteraceae family, including Joe Pye weed, have their nectaries sited between the style base and the top of the ovary.

Some plant's nectaries can replenish within a couple of minutes, and others may take all day. It depends on the species, temperature, humidity, cloudi-

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## Butterflies Nectaring on Joe Pye weed Around a one-third Acre Pond in Easton

When designing a butterfly habitat, include both larval host and adult nectar plants. If you don't have room for a particular plant, remember, it may already be down the road. Below are larval host plants.

**1 – Monarch**
Common Milkweed *(Asclepias syriaca)*, Swamp Milkweed *(Asclepias incarnata)*, Butterflyweed *(Asclepias tuberosa)* and other native milkweeds.

**2 – Great Spangled Fritillary**
Violets (*Viola* spp.)

**3 – Painted Lady**
Western Mugwort *(Artemisia ludoviciana)*, Mallows (*Malva* spp.), Lupine *(Lupinus perennis)*, Thistles (*Cirsium* spp.), wide variety of plants, especially Malvaceae

**4 – Eastern Tiger Swallowtail**
Black Cherry *(Prunus serotina)*, Tulip Tree *(Liriodendron tulipifera)*, Sassafras *(Sassafras albidum)*, Magnolias (*Magnolia* spp.)

**5 – Red Admiral**
Stinging Nettle *(Urtica dioica)*, False Nettle *(Boehmeria cylindrica)*

**6 – Spicebush Swallowtail**
Spicebush *(Lindera benzoin)*, Sassafras *(Sassafras albidum)*

**7 – Least Skipper**
Little Bluestem *(Schizachyrium scoparium)*, Kentucky Bluegrass *(Poa pratensis)*

**8 – Tawny-edged Skipper**
Kentucky Bluegrass *(Poa pratensis)*, Little Bluestem *(Schizachyrium scoparium)*

**9 – Fiery Skipper**
Little Bluestem *(Schizachyrium scoparium)*, Kentucky Bluegrass *(Poa pratensis)* and other grasses

**10 – Peck's Skipper**
Kentucky Bluegrass *(Poa pratensis)*, Little Bluestem *(Schizachyrium scoparium)*

**11 – Zabulon Skipper**
Orchard Grass *(Dactylis glomerata)*, Switchgrass *(Panicum virgatum)*, Little Bluestem *(Schizachyrium scoparium)* and other grasses

**12 – Sachem**
Crabgrass (*Digitaria* spp.), Bermuda Grass *(Cynodon dactylon)*

**13 – Gray Hairstreak**
Tick-trefoil (*Desmodium* spp.), Bush Clovers (*Lespedeza* spp.), Clovers (*Trifolium* spp.)












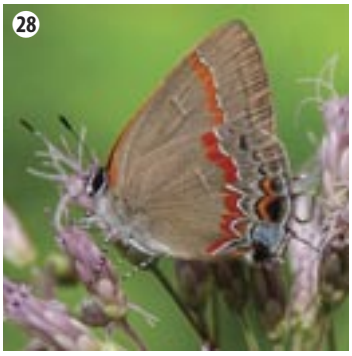



**29 – Honeybee**
*Apis* spp.


**30 – Bumblebee**
*Bombus* spp.

**14 – Eastern Tailed Blue**
Wild Indigo *(Baptisia tinctoria)*, Tick-trefoils (*Desmodium* spp.), Lupine *(Lupinus perennis)*, Vetches (*Vicia* spp.), Clovers (*Trifolium* spp.), Bush Clovers (*Lespedeza* spp.)

**15 – Orange Sulphur**
Clovers (*Trifolium* spp.), Wild Indigo *(Baptisia tinctoria)*, vetches (*Vicia* spp.), Lupine *(Lupinus perennis)*

**16 – Clouded Sulphur**
Clovers (*Trifolium* spp.)

**17 – Clouded Sulphur/Orange Sulphur Hybrid**

**18 – Silver-spotted Skipper**
Black Locust *(Robinia pseudoscacia)*, Tick-trefoils (*Desmodium* spp.), Groundnut *(Apios americana)* and other legumes

**19 – Cabbage White**
Mustards (*Brassica* spp.), Rock Cresses (*Arabis* spp.), Winter Cresses (*Barbarea* spp.), Bitter Cresses (*Cardamine* spp.) and garden crops such as cabbage

**20 – Common Sootywing**
Amaranth *(Amaranthus retroflexus)*, Pigweed *(Chenopodium album)*

**21 – American Copper**
Red Sorrel *(Rumex acetosella)*, Curly Dock *(Rumex crispus)*

**22 – American Lady**
Pearly Everlasting *(Anaphalis margaritacea)*, Plantain-leaved Pussytoes *(Antennaria plantaginifolia)*, Field Pussytoes *(Antennaria neglecta)*

**23 – Pearl Crescent**
Smooth Aster *(Symphiotrichum laeve)*, Panicled Aster *(Symphiotricum lanceolatum)* and other Asters

**24 – Ocola Skipper**
Rice Cutgrass *(Leersia oryzoides)* and other grasses

**25 – Summer Azure**
Dogwoods (*Swida* spp.), Meadowsweet *(Spirea alba)* and many other plants

**26 – Common Buckeye**
Butter-and-Eggs *(Linaria vulgaris)*, English Plantain *(Plantago lanceolata)*

**27 – Horace's Duskywing**
Oaks (*Quercus* spp.)

**28 – Red-banded Hairstreak**
Sumac (*Rhus* spp.)

**Reference**
O'Donnell, Jane E., Gall, Lawrence F., Wagner, David L., 2007. *The CT Butterfly Atlas*, State Geological & Natural History Survey Dept. of Environmental Protection, Bulletin No. 118

# Life with Joe Pye Weed — *continued from page 15*

ness and time of day. No studies have been done on the nectar replenishment capabilities of Joe Pye weed. The amount of sugar, composed mainly of sucrose, glucose and fructose, can vary from 3% to 80%. Nectar also contains valuable proteins, salts, acids and essential oils.

For years I have wondered about the nutritional value of nectar in native flowering plants. Is Joe Pye weed's nectar sweeter, and more beneficial than other species?

I went to the Connecticut Agricultural Experiment Station and discussed my interest in testing the nutritive qualities of nectar with Kelsey E. Fisher, Ph.D., who is in the Department of Entomology. She enthusiastically shared my interest. We thought we could do some preliminary tests.

> "A Joe Pye weed flower head is big and has a lot of florets that are maturing at different rates."

I brought samples of Spotted Joe Pye weed *(Eutrochium maculatum)* and Blue Vervain *(Verbena hastata)* to her lab. She had been working on a project with Monarch butterflies and was feeding them Gatorade. She suggested that we first test the Gatorade by using a digital refractometer, a device that measures the dissolved sugar content on the Brix scale, to get a base line measurement. The Gatorade measured 6.3% on the Brix scale. A ripe banana measures 18.6%.

She crushed flowers of the Joe Pye weed and placed them into a test tube. She then carefully measured and added some distilled water. She took a sample of the liquid and placed it on the refractometer. It registered 1.5% on the Brix scale. Not terribly impressive.

But then we performed an experiment on Blue Vervain *(Verbena hastata)*. It blooms contemporaneously with Joe Pye weed. It was only 0.7% Brix. The Joe Pye weed was double in sugary goodness! Yum! No wonder the pollinators lingered on Joe longer. I would love to do Brix tests on as many native plants as I can; especially those that grow near, and bloom in sync, with Joe Pye weed.

This August, I will venture down to the pond and wait patiently near my lovely Joe Pye weed friends. I'll watch for new pollinators to arrive and surprise me. I'll watch them feast. How sweet it is!

*Christine Cook is a landscape designer, artist and educator whose company, Mossaics Ecological Landscape Design, specializes in pollinator gardens, habitat restoration and moss garden design. She is a past board member of the Connecticut Butterfly Association. Find out more at* mossaicsecolandscapes.com

Christine Cook

A Mossaics project in Fairfield County.