

Solving the Case of the Shady Invaders

By Erynn Maynard, M.S. Ph.D. Candidate in Ecology at Penn State

Picture a bird flitting about in search of insects or fruit. When danger approaches it can swiftly retreat and hide. In contrast, plants are generally rooted in place. Beyond making them comparatively easier to study than animals (much to the chagrin of my colleagues who are currently wading through coldwater streams to relocate radio-tagged fish), it also makes plant survival and success fascinating. Because plants are spatially static, they are dynamic through time. Plants can optimize their fixed situation through the timing of important life history events. For example, young leaves tend to be more delicious and less defended than older leaves. Some plants have been found to break buds and leaf out much earlier than when their insect herbivores emerge, giving leaves time to grow and develop defenses. Yet the benefits of early leaf production have to be balanced with the risks of a late frost and leaf damage. Recurring or cyclic life history events such as breaking leaf buds, flowering, fruiting, fall color change, and senescence are called *phenophases*. The study of how phenophase timing varies across a landscape and through years is called *phenology*. You can think of phenology as how tuned a species is to their surroundings. As such, phenology is one of the most important drivers of the success of a species. In fact, species that



Figure 1. Extended leaf phenology

become highly successful in a new range (those we call invasive species) frequently exhibit novel phenology compared to the communities that they invade. For example, invasive grasses in western rangelands green up earlier than native species, taking up space before natives can.

If you spend time outside in Pennsylvania, you've probably seen shrubs creeping into eastern deciduous forest stands. You may have also noticed that these invasive shrubs, such as honeysuckles (*Lonicera maackii*, *L. Morrowii*, *L. tartarica*), Japanese barberry (*Berberis thunbergii*), and burning bush (*Euonymus alatus*), tend to be green much longer than native shrubs in the understory. This earlier bud burst and/or later leaf color change compared to

native species is called extended leaf phenology (see Figures 1 & 2 for examples). Why does extended leaf phenology of the shrub layer matter in eastern deciduous forests? To start, there is more light available in the understory of deciduous forests in the early spring and late fall when the overstory canopy is leafless (Figure 3). Over the course of the growing season, this has been shown to provide significantly more food (through photosynthesis) for some invasive shrubs, when compared to natives. Beyond this direct benefit to the invasive shrubs, their extended leaf phenology has the potential to impact ecosystems through novel

shading. The majority of the plant diversity in an eastern deciduous forest occurs in the herbaceous layer, and many native herbaceous species have extended leaf phenology compared to the overstory canopy. In fact, spring ephemerals are a group of herbaceous plants that are specifically adapted to green up, flower, fruit, and die back while more light is available prior to the canopy layer leaf-on. Additionally, many tree seedlings and saplings have extended leaf phenology compared to mature individuals of the same species in the overstory — an adaptation helping young trees to survive in their parents' shade. So it's not surprising that the presence of some invasive shrubs has been associated with decreased native

continued on page 3



Dear Members,

In my last newsletter, I announced that I would be stepping down from my position as PNPS Board President in 2017. What can I say? "The best laid plans of mice and gardeners often go awry." Actually, most of the current Board has committed to continue for another term and has been reelected at our Annual Meeting this past September. Our

plan is to reform the nomination committee and begin again.

The Board of PNPS is very committed to the future of this organization and we look forward to continuing our service. However, the future of PNPS depends on bringing new blood onto the Board and establishing a transitional plan for future service on this Executive body. A healthy flow of new ideas and fresh energy will help to move us into the next decade. Please consider getting more involved by serving on our Board. If you or someone you know would be interested in serving on our Board, please email our Vice President, Debra Grim at vp@panativeplantsociety.org

This coming year we plan to continue outreach at a number of events around the state. We would welcome your help in representing us at an event near you. If you attend an event related to Native Plants and would like to manage a PNPS information table please send an email to events@panativeplantsociety.org

On behalf of our Board and Members I would like to thank The Arboretum at Penn State for partnering with us to hold our 2016 Annual Meeting. I would also like to thank Clearwater Conservancy, LandStudies Inc, Penn State Extension Master Gardeners and the Penn State Center for Pollinator Research for their support of this event. If you weren't able to attend, visit our website for video of the speaker and panel: www.panativeplantsociety.org

Planning for the 2017 Annual Meeting is underway. Mark your calendars for Saturday, September 23. Details will be coming soon, check our website regularly for more information: www.panativeplantsociety.org/events

Sincerely,

Jean Najjar

Jean Najjar, President

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PNPS GRANT REQUESTS AVAILABLE

The Pennsylvania Native Plant Society (PNPS) advocates conservation of native plants and their habitats, and promotes the increased use of native plants in the landscape. PNPS has supported numerous demonstration gardens through direct management or grants in order to better educate the public on the use of native plants in the landscape. Some examples can be found on our website under Demonstration Gardens.

When our budget allows, we give small grants to groups working on projects focused on outreach, education and research related to native plants. To apply for funds please complete and submit our electronic form by:

- 1) going to Demonstration Gardens on our website (www.panativeplantsociety.org/demonstration-gardens.html) and clicking on link under PNPS Grant Request
- 2) www.panativeplantsociety.org/demonstration-gardens.html

If you have questions please email Jean Najjar at president@panativeplantsociety.org



THE CENTRAL PA NATIVE PLANT FESTIVAL AND SALE

This year marked our 1st event at our new location — Pa Military Museum grounds in Boalsburg, PA. Although we have enjoyed our partnership with Shaver's Creek, we just outgrew the location — and they will not be available for the next year or two due to some construction, so it seemed like a good time to make a change. The new location provides lots of parking and vendor space. Of course the perfect weather helped! We had a record number of visitors (Over 1,300 — more than double our past experience) and the vendors reported it was one of their better sales — several even sold out due to the number of attendees. They say they will plan for increased sales for next year.

PNPS member Eric Burkhart conducted a walk and talk on Natives and Invasives and Katie Ombalski gave a walk and talk on stream restoration on the site.

All in all, it was worth all the work and lots of plants now have new, happy homes. And hopefully, we converted a few new people to the benefits of native plants.

Mark your calendars for next year's festival — May 6, 2017.

Shady Invaders...

continued from page 1

herbaceous diversity and decreased tree regeneration. However, novel shading from invasive shrubs can also impact temperature, decreasing daily maximum temperatures which could affect insect and herptofaunal (reptile and amphibian) emergence. Additionally, the novel shading produced by Amur honeysuckle (*L. maackii*) has been found to reduce the pollination of herbaceous species. It turns out that many pollinators don't like the cooler, darker conditions created under a honeysuckle canopy. Another study found that small mammals (e.g. mice, chipmunks) use honeysuckle as habitat and preferentially browse natives in the understory. Ecologists call this "apparent competition." In other words, it appears as if honeysuckle is a strong competitor, better at taking advantage of light and soil resources, when in actuality its success may be the result of indirect mechanisms.

While some invasive shrubs remain highly understudied, the research that has occurred is spatially limited. A single researcher or research group can only look at so many species and so many places. However, the cues that a plant might use to trigger phenophases such as budburst, flowering, and leaf color change frequently vary across species. Furthermore, the cues themselves, including day-length, temperature and precipitation, vary through space and between years. Is the difference in leaf phenology between a given native and invasive shrub in central Pennsylvania comparable to the difference seen in North Carolina or Missouri? How do these differences vary for other native and invasive



Figure 2. Extended leaf phenology

shrubs? How widely applicable is research on the impacts of extended leaf phenology across species and space? To answer these questions, I need help, a lot of it. I teamed with the USA National Phenology Network to create a citizen science campaign called *Shady Invaders* that began in the spring of this year (website: www.usanpn.org/nn/ShadyInvaders). We have grown to 188 sites in eastern deciduous forest stands in our first year, and are continuing to recruit volunteers to help gather data that can be used to create models that answer the questions above. If you go on a weekly walk in the woods, or have a woodlot with at least a partially deciduous canopy nearby, your help would be greatly appreciated. To participate, sign up at the top of the page listed above, and add your site details to your *Nature's Notebook* account. At your site, choose several native and invasive shrubs to tag and visit about once a week in the spring and fall, and every other week or so in the summer. The data

collection is straight-forward, with instructions that print with the data sheets. Observations of 'no' for phenophases are just as important as observations of 'yes' in order to catch an accurate beginning and end for each phenophase for each individual you follow. With the help of citizen scientists, I hope to tease apart species-specific patterns across eastern deciduous forests in order to understand the impacts of invasive shrubs, and to help better guide management efforts. With limited observations, especially at the beginning of the season, I still found evidence of extended leaf phenology for our 7 invasive shrubs compared to our 8 native shrubs. The species are listed on the website above. You can also view the recorded campaign kick-off webinar for additional information, and register for the upcoming year one summary webinar on Nov. 28th at 1pm.

Want to participate or have questions? Contact me at eem212@psu.edu

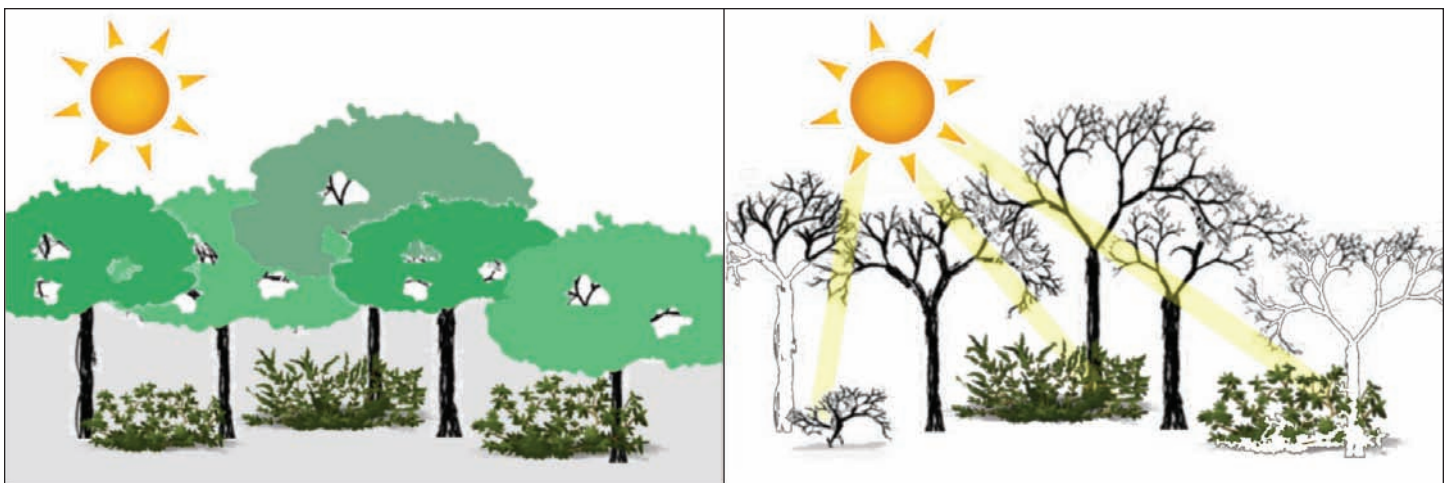


Figure 3. More light available in the understory of deciduous forests in the early spring and late fall when the overstory canopy is leafless.

Go Native!



1. *Monarda fistulosa*, Begonias; 2. *Ratibida pinnata* Yellow cone flower

by Harold "Hal" Gardner

In times gone by, most of Pennsylvania was forest with vernal wildflowers in the under-story. European immigrants totally changed this picture, especially in areas settled for centuries. In the valley of Cumberland County, 90 to 99% of herbaceous species are Eurasian. Due to the longer life of native trees, the trees are hanging in

there, but horticulturists are promoting exotics for suburban lawns. Certain introduced trees, like tree-of-heaven, buckthorn, autumn olive, privet, and alien honeysuckles are extremely aggressive. On my woodland property it is interesting that herbivore wildlife will not touch the aliens, including the herbs or grass, garlic mustard, Japanese stilt grass/Nepalese brown-top, and dames rocket. Rather they

scavenge many of the natives that I have reintroduced. Of course, deer are more populous than former times due to lack of predators.

The woodland plants that best survive munching by deer and woodchuck are: *Eupatorium rugosum* White snakeroot (abundant), *Blephilia hirsuta* Hairy wood mint (abundant), *Claytonia virginica* Spring beauty *Mertensia virginica* Virginia cowslip, *Podophyllum peltatum* May apple, *Pycnanthemum verticillatum pilosum* Hairy mountain mint, *Campanulastrum americanum* Tall bellflower, *Carex glaucoidea* Blue/Glaucous sedge, and *Diarhena americana* American korycarpus grass.

In agricultural areas much of the woodland has been cleared of trees affording full sunlight, which supports entirely different types of herbaceous plants and grasses. If you are inclined to grow this type of ecosystem called meadow or prairie, it will require different plants that grow to maturity in the summertime. A list of easy to grow prairie plants for the East has been prepared for the North American Prairie Conference in Normal, IL (1). For these plants, the soil was underlain with shale, but due to the hills and hollows moisture ranged from dry-mesic (dm) through mesic (m) to wet-mesic (wm). It is very



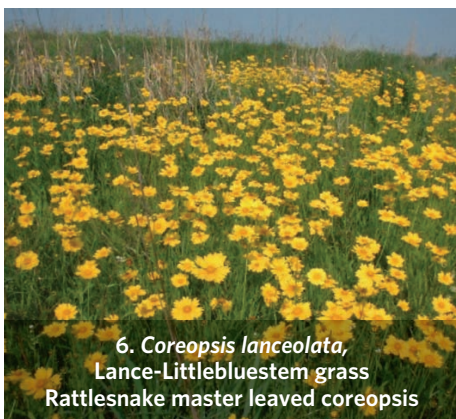
3. *Penstemon digitalis*, Foxglove beardtongue



4. *Shizachyrium scoparium*



5. *Erygium yuccifolium*



6. *Coreopsis lanceolata*, Lance-Littlebluestem grass
Rattlesnake master leaved coreopsis



7. *Echinacea pallida*, Pale purple



8. *Rudbeckia subtomentosa*, Sweet black-eyed Susan

important to place seed where the plant prefers to grow. Also, most wild seed requires over-wintering in order to germinate. Plants are listed with moisture preference and early or peak flower time, and they are listed in order of their ease of propagation. I recommend a small percentage of grass. Seed can be obtained from Prairie Moon Nursery. Glyphosate (a.k.a. Round-up) kill of the area should be completed in September for seed sowing in November-December. Most plants are perennial, thus require 3 to 5 years to develop. The first two years may require high mowing to suppress annual weeds. There are more than 60 easy to grow species, which gives a mega-boring list.

Thus, the first 8 are shown below. If you want the whole list e-mail me at hrl-d-grdnr4@aol.com

Easy to restore in south-central PA on shale soil (with proper conditions in approx. order of ease. Also selected for attractive aspect)
(Do not use *Symphytotrichum pilosum*, *Eupatorium altissimum*, *Solidago canadensis*, *Mirabilis nyctaginea*, *Panicum virgatum* & *Apocynum cannabinum*, too aggressive).

1. *Monarda fistulosa* Begamot (m,wm,dm, 7/3)
2. *Ratibida pinnata* Yellow coneflower (m,dm, 7/3)

3. *Penstemon digitalis* Foxglove beardtongue (dm,m,wm, 5/31)
4. *Shizachyrium scoparium*
5. *Erygium yuccifolium*
6. *Coreopsis lanceolata*, Lance-Littlebluestem grass Rattlesnake master leaved coreopsis (dm,m, 5/21) (dm,m, 9/14) (m,wm, 7/7)
7. *Echinacea pallida*, Pale purple
8. *Rudbeckia subtomentosa*, Sweet black-eyed coneflower (dm,m, 6/14) Susan (wm,m, 7/19-8/30)

REFERENCE: Gardner, H.W., and Paddock, D. (2016) North American Prairie Conference, Normal, IL (July 17-20) Poster Session.

Are Chestnut Hybrids Truly Natives?

By Dr. Douglas Tallamy, Professor & Chair of Entomology and Wildlife Ecology, University of Delaware, Newark, DE

Reprint Chestnut Tree Newsletter, VOLUME 20_ISSUE 2, PA Chapter of The American Chestnut Foundation

We often hear about how important American chestnuts were to sustaining wildlife east of the Mississippi, primarily because their prodigious annual nut production fed so many mammals and birds for months on end. Equally important (or even more from the perspective of species numbers) was the diversity and abundance of insects created each year by chestnuts. The American chestnut is a member of the Fagaceae, a plant family that includes oaks and beeches.

Because caterpillars are the most important component of terrestrial bird's diets in North America, particularly when birds are reproducing, and the oaks lead other plant genera in hosting caterpillar species, it is not hard to imagine that chestnuts produced enormous numbers of caterpillars when breeding birds needed them most.

In my view, this is the most important ecological contribution of our native plants. They support food webs better than non-natives. This is not a philosophical distinction — it is a distinction based on hard science.

Some have wondered whether the backcrossed chestnuts that contain genes resistant to chestnut blight should be considered true natives. In my view they can be considered natives if they act like

natives. Insects track their host plants by leaf volatiles. Larval success on leaves is, in turn, determined by the phytochemistry of those leaves. If resistant chestnuts smell and taste like the original American chestnuts, they will support the same insect load that the original chestnuts supported, and thus be just as valuable ecologically. I am

currently comparing resistant genotypes with susceptible genotypes in terms of their ability to support insects, but so far I see no difference. If these results hold, no matter what we call restored chestnuts, they will behave like true natives. Good news indeed!

Examples of wildlife connections



Nadata gibbosa or the White Dotted Prominent feeds principally oak and other Fagaceae.



Polyphemus caterpillar



Protonotaria citrea or Prothonotary Warbler with captured Nadata gibbosa.



Polyphemus being fed to White Eyed Vireo — Vireo griseus a small song bird found in Eastern and Southern U.S.

WINGS IN THE PARK 2016 — A CELEBRATION OF LIFE

By Pam Ford

Tom Tudek Memorial Park came alive with activity this past July as the community celebrated the 20th anniversary of the Snetsinger Butterfly Garden and “Butterfly Bob” Snetsinger, the man who dedicated his life to establishing habitat for butterflies as critical components of ecosystems. Fifty monarchs took flight during a butterfly release to commemorate the occasion. Cosponsored this year by Penn State Extension Master Gardeners of Centre County, The Pennsylvania Native Plant Society, and Centre Region Parks and Recreation, this popular educational event, was enjoyed by over 900 attendees.

At this summer’s *Wings in the Park* event, PNPS provided an educational opportunity to teach youth the importance of garden stewardship, having children participate in watering the PNPS Demonstration Garden while observing interesting plant and insect interactions. In



Children play the “Nice Native vs. Icky Invasive” matching game.

addition to this activity, the Nice Native/Icky Invasive Matching Game tested children’s memory skills and native plant awareness. PNPS also gave away native plant seed packets of *Asclepias tuberosa* (Orange Butterfly Weed) and *Monarda fistulosa* (Wild Bergamot), species known to attract a diversity and abundance of pollinators. Native plant stickers and tattoos were also a big hit at the ninth annual family celebration of bees, butterflies, and the plants that support them.

Mark your calendars for next year’s *Wings in the Park* event, scheduled for July 22, 2017.

PA BOTANY SYMPOSIUM

By Danielle Lanagan and Merrill David

PNPS was a sponsor of the 2016 PA Botany Symposium in State College, PA on Nov 18–19. The goal of the symposium is “that by convening both amateur and professional botanists from throughout the region, we can focus greater attention on the need to better appreciate, understand, and conserve our region’s native plant heritage.” Workshops were held during the day Friday, with a social and student poster session in the evening. Saturday was a full day of talks beginning with the keynote address “*Botany and Botanists: More Relevant Than Ever!*” by Peggy Olwell, Plant Conservation Program Lead, Bureau of Land Management. Olwell explained the importance of the National Seed Strategy, and discussed the lack of botanists in the federal government. She noted that there are no botanical organizations on Capitol Hill, with all attention paid to wildlife. “Plants,” noted Olwell, “are our national infrastructure” and more attention to botany is critically needed.

Visit our website:
www.panativeplantsociety.org

FEDERAL AID FOR CREATING HABITAT

By Debra Grim

This July I was delighted to attend a Xerces Society short pollinator course in State College. Xerces is a nonprofit entity dedicated to the conservation of invertebrates, named after a West Coast species of butterfly last seen in 1941. According to their website, the organization has “protected endangered species and their habitats, produced ground-breaking publica-

tions on insect conservation, trained thousands of farmers and land managers to protect and manage habitat, and raised awareness about the invertebrates of forests, prairies, deserts, and oceans.”

The course was excellent, with thought-provoking speakers, and registration included a copy of their book, *Attracting Native Pollinators*. I highly recommend both the course and the

book. The Xerces.org website offers a wealth of information, including pollinator-friendly plant lists and other fact sheets, webinars, and a blog that has featured the writing of our own Justin Wheeler, a former PNPS board member.

I discovered many wonderful things about pollinators that day, but one learning I especially want to share is about the Environmental Quality Incentives Program (EQIP), part of the Farm Bill. Administered by the USDA Natural Resources



Prior to serving as Vice President of PNPS, Debra Grim served as President and Treasurer. She is a Penn State Master Gardener in Centre County, a Master Gardener educator at the Snetsinger Butterfly Garden at Tudek Park, and a tireless champion of native flora everywhere.

Conservation Service (NRCS), the measure is designed to provide financial and technical help to agricultural producers to implement practices that address natural resource issues on their property. But the aid is not restricted to farmers. Any owner of forest land or pastures not used for industry may participate.

Applicants must own or control eligible land, fit the income guidelines, follow conservation requirements, and develop a plan of operations. Members of “socially disadvantaged” groups, farmers or ranchers with limited resources or those who served in the military, and beginning farmers or ranchers are eligible. This would be a good way to help finance the planting of a new wildflower meadow, for instance.

To apply, go to www.nrcs.usda.gov/getstarted or visit your county USDA Service Center. If you have applied for one of these grants, successfully or not, I would love to hear your story. Please contact me at vp@panativeplantsociety.org.

The Marilyn Quigley Gerhold Wildflower Trail in The Arboretum at Penn State

Returning Native Plants to an Old-Growth Oak Forest



Shari Edelson leads a tour of the Hartley Woods as part of the PNPS Annual Meeting. Shari was also part of our panel discussion.

*By Shari Edelson, Director of Horticulture
& Curator, The Arboretum at Penn State*

Recent visitors to the network of hiking trails in The Arboretum at Penn State may have noticed some changes underway in Hartley Wood. Hartley Wood, as a forested tract located largely within the Arboretum, has long been recognized as a valuable conservation, educational, and aesthetic resource. A 42-acre remnant old-growth stand, most of it was spared from the logging that impacted many of the region's forests during the 18th and 19th centuries. The forest canopy is dominated by white oak. Many of these specimens are approximately 160 years old, and at least four are over 300. Below this impressive canopy, however, the forest's shrub and herbaceous layers are dominated by non-native invasive flora which have colonized the woodland over recent decades, likely spreading from nearby residential areas.

While we had sought for many years to curtail the spread of invasive plants within Hartley Wood and restore the area's native flora, limited financial and personnel resources had presented constraints. This changed in 2014, when Dr. Henry Gerhold, professor emeritus of Forest Genetics at Penn State, approached the Arboretum

with a plan to establish a native wildflower collection within Hartley Wood in memory of his wife, Marilyn Quigley Gerhold. Thanks to a generous donation from Dr. Gerhold, work on the creation of the Marilyn Quigley Gerhold Wildflower Trail began in summer 2015. Removal of the invasive plants choking the forest understory was a critical first step in the reestablishment of native species. To date, over three acres of the woodland have been cleared of privet, bush honeysuckle, winged euonymus, and other noxious plants. Reestablishment and augmentation

of native plants has also begun, with nearly 6,000 native wildflowers, understory trees, and shrubs, representing 21 different species, installed in spring 2016.

As might be imagined, a venture of this magnitude requires the support of many people. To date, Vasiliy Lakoba, the Arboretum's Wildflower Trail project coordinator, has had the assistance of 1,007 individual volunteers, who have provided a total of 2,640 hours of hands-on service. In addition, the Arboretum has benefited greatly from the expertise of the Wildflower Trail steering committee, whose members bring professional experience in the fields of restoration ecology, natural lands management, forestry, and botany.

This winter, our work will focus on the development of interpretive and wayfinding signage, as well as a visitor map of Hartley Wood and the Wildflower Trail. In addition, we will be sourcing more plants for our spring 2017 installation, as well as working with volunteers to make trail improvements and remove still more invasive plants.

We are grateful for the support of PNPS members, and welcome you to visit Hartley Wood — or help out with the Wildflower Trail project — anytime! For volunteer inquiries, contact Vasiliy Lakoba at vtl106@psu.edu. For general inquiries regarding the project, contact Shari Edelson at ske13@psu.edu.

2016 PNPS ANNUAL MEETING

One yard at a time — you can make a difference, was the theme of our 2016 Annual Meeting. It was all about transitioning residential landscapes to natives with the goal of great sustainability. Our guest speaker, Kelly M. Gutshall, owner and president of LandStudies, Inc. gave a presentation highlighting her firm's experience with using natives in their designs. This was followed by a lively panel discussion with questions from our audience. We wrapped up the event with a tour of Hartley Woods in the Arboretum at Penn State. The tour was led by Shari Edelson, Director of Horticulture & Curator, The Arboretum at Penn State, The Pennsylvania State University

This year's meeting was presented in partnership with The Arboretum at Penn State, and in collaboration with Clearwater Conservancy, LandStudies, Inc., Penn State Extension Master Gardeners and the Penn State Center for Pollinator Research.

Our Education committee is busy planning our 2017 Annual Meeting. If you have suggestions for speakers or venues; or if you would like to help with planning this event please contact events@panativeplantsociety.org



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Please remember to renew.

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Presorted Standard
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PAID
State College, PA
Permit No. 21

***Nymphaea odorata*, American White Water-lily**

Photographer: Kathleen Engle • Location: Pine Grove Furnace, PA
PNPS 2016 Facebook Group Photo Contest Winner



Join PNPS on Facebook: facebook.com/groups/panativeplantsociety

2017 EVENTS

JANUARY 17 • TUESDAY

5:00 pm to 7:00 pm

PNPS Board Meeting and Presentation
Public viewing of Catherine Zimmerman videos at Schlow Memorial Library
State College, PA

MARCH 15 • WEDNESDAY

5:00 pm to 7:00 pm

PNPS Board Meeting and Tour PAC
Herbarium at Penn State
University Park, PA

MAY 6 • SATURDAY

Central Pennsylvania Native Plant Festival
Boalsburg Military Museum
Boalsburg, PA

JULY 22 • SATURDAY

Wings In the Park
www.snetsingerbutterflygarden.org
Snetsinger Butterfly Garden in
Tudek Park
State College, PA

SEPTEMBER 23 • SATURDAY

PNPS Annual Meeting
State College, PA

For more information on these and other events please visit our website:
www.panativeplantsociety.org