



Gardening with Nature in Mind

Michael J. McGraw, MES, QAWB, ACE

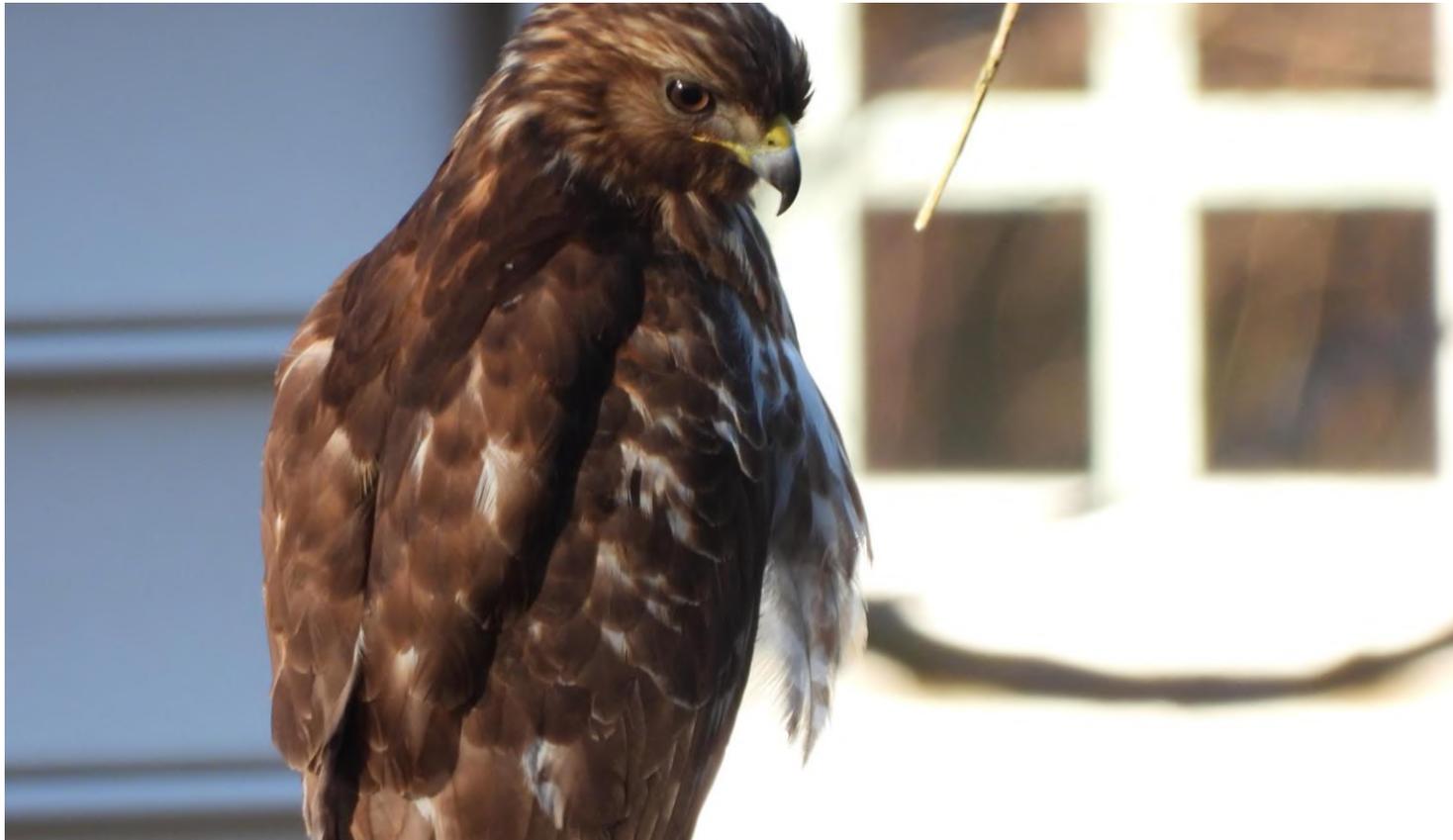
Resource Environmental Solutions (RES)

in Partnership with Dauphin Co Parks and
Recreation

January 10, 2023



Outline



- Personal Background
- Ecological Context for Native Gardening
- Plant-Animal Interactions at the Appropriate Scale
- Some Examples
- Best Plants for the Region/Scale
- Discussion

A red-shouldered hawk perched on my neighbor's fence hunting eastern garter snakes in my yard. Image by M. McGraw

About Me

- Southeastern PA Boy
 - Delaware County
 - Philadelphia
 - Mom's side from Reading and N Maryland
- BS in Environmental Science @ Drexel University (2002)
- Consultant and Researcher
- MES in Environmental Biology @ University of Pennsylvania (2015)
- Adjunct Instructor of Ornithology (UPenn)
- Adjunct Instructor of NE Woodland Ecosystems (Temple U)
- Bander in Charge @ Rushton
- Proud Daddy and Recent Homeowner

Mike McGraw

Master of Environmental Studies '15,
University of Pennsylvania

Learn more about Mike's conservation efforts around the country at www.upenn.edu/grid



Walk-In
WEDNESDAYS

Penn's admissions staff is here to answer your



"I'm a big kid getting paid to play in the mud," laughs Mike McGraw (Master of Environmental Studies '15), the Senior Wildlife Biologist and Ecologist and the PA Branch Manager for Applied Ecological Services. As a proud Philadelphian, going to the Ivy League in his own backyard was a natural choice.

"One of the most attractive elements of Penn's MES program was the ability to customize the curriculum." The program's flexibility helped him balance work and family life, and it opened him up to new possibilities. Between learning geographic information system (GIS) mapping in the classroom to hiking through the remote Boundary Waters Canoe Area Wilderness for his capstone, Mike pushed frontiers professionally and geographically.

Today, Mike has his heart set on a PhD and keeps busy with projects like the Washington Avenue Pier in Philadelphia and the Seneca Meadows Wetlands Preserve in New York. "I'm doing what I love," he smiles, "This program helped



Vision & Mission

Vision

Restoring a resilient earth for a modern world

Mission

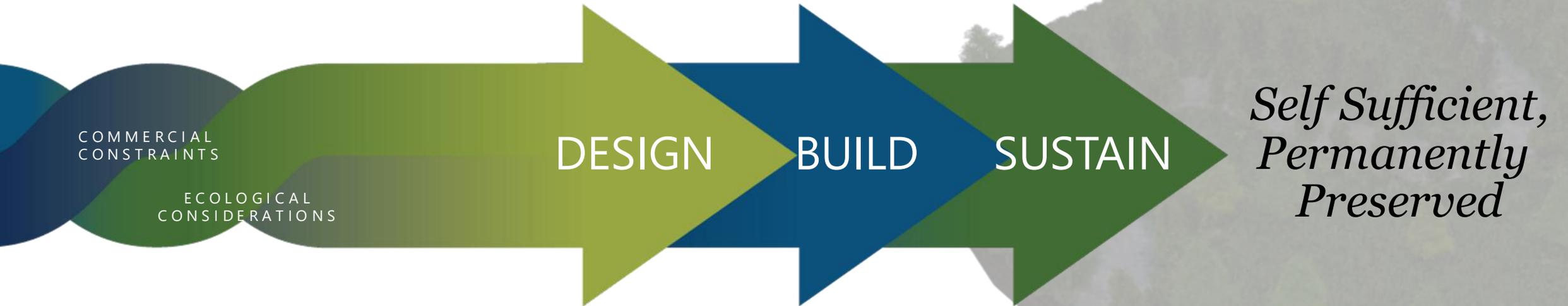
RES restores our land and waters with ecological integrity and innovation, project by project.

We support the rehabilitation and stewardship of nature's resources alongside responsible human progress.



RES: Total Stewardship, Guaranteed Results

Successful ecological outcomes by leaning into constraints, with creative problem solving and total stewardship.



RES Team

Behind the Scenes

- Land acquisition
- GIS specialists
- Environmental, health, safety and security
- Regulatory project managers
- Project controls
- Government affairs
- Public and community relations
- Financial
- Legal

On the Ground

- Certified foresters
- Construction managers
- Engineers
- Field crew members
- Field ecologists
- Hydrologists
- Landscape architects
- Nursery managers
- Rosgen IV certified stream designers
- QA/QC oversight teams
- Superintendents
- Wetland scientists
- Wildlife biologists

Restoring our land and waters



406

Mitigation sites



22,900,000

Trees planted



73,932

Acres of restored and protected lands



607

Miles of streams restored and conserved



20,200

Acres of special-status species habitats



292

Tons of water quality nutrient reductions

- All “wildlife” is dependent upon specific elements within the landscape (both biotic and abiotic). Therefore, understanding the presence or absence of target wildlife helps to diagnose the functionality of a green space.



VS



- All “wildlife” is dependent upon specific elements within the landscape (both biotic and abiotic). Therefore, understanding the presence or absence of target wildlife can help to diagnose the functionality of a site.



Image by: M.J. McGraw

Predator
Perch



VS



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Image by: M.J. McGraw



Host plant for rare butterfly



VS



Predator Perch

- All “wildlife” is dependent on the presence of biotic (and abiotic) elements within the landscape. Therefore, the presence or absence of target wildlife helps to diagnose the functionality of a site.



Image by: M.J. McGraw

Host plant for rare butterfly

Narrow Configuration

Predator Perch



VS



- All “wildlife” is dependent upon specific elements within the landscape (biotic and abiotic). Therefore, understanding the presence or absence of target species helps to diagnose the functionality of



Image by: M.J. McGraw

Predator
Perch

Host plant for
rare butterfly

Narrow Configuration



VS



Non-flowering
plants that are key
late-season

nectaring species

Images by: M.J. McGraw



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Host plant for
rare butterfly

Narrow Configuration

Wetland/Water

Predator
Perch



VS



Non-flowering
plants that are key
late-season

nectaring species

- All “wildlife” is dependent on specific elements within the landscape (biotic and abiotic). Therefore, the presence or absence of these elements can help to diagnose the functionality of a site.



Images by: M.J. McGraw

Host plant for rare butterfly

Narrow Configuration

Wetland/Water

Predator Perch

Mowed in June



VS



Non-flowering plants that are key late-season nectaring species

Images by: M.J. McGraw

- All “wildlife” is dependent upon the presence of biotic (and abiotic) elements within the landscape. Therefore, understanding the presence or absence of target wildlife helps to diagnose the functionality of a site.



Image by: M.J. McGraw

Host plant for rare butterfly

Narrow Configuration

Wetland/Water

Predator Perch

Mowed in June

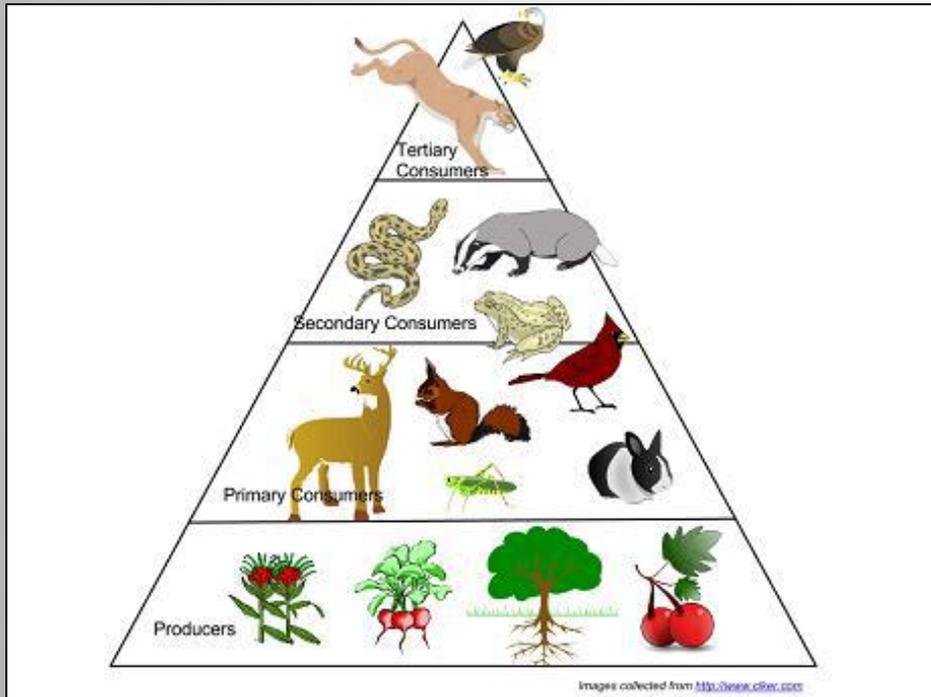
VS

Healthy Soils

Non-flowering plants that are key late-season nectaring species

Images (

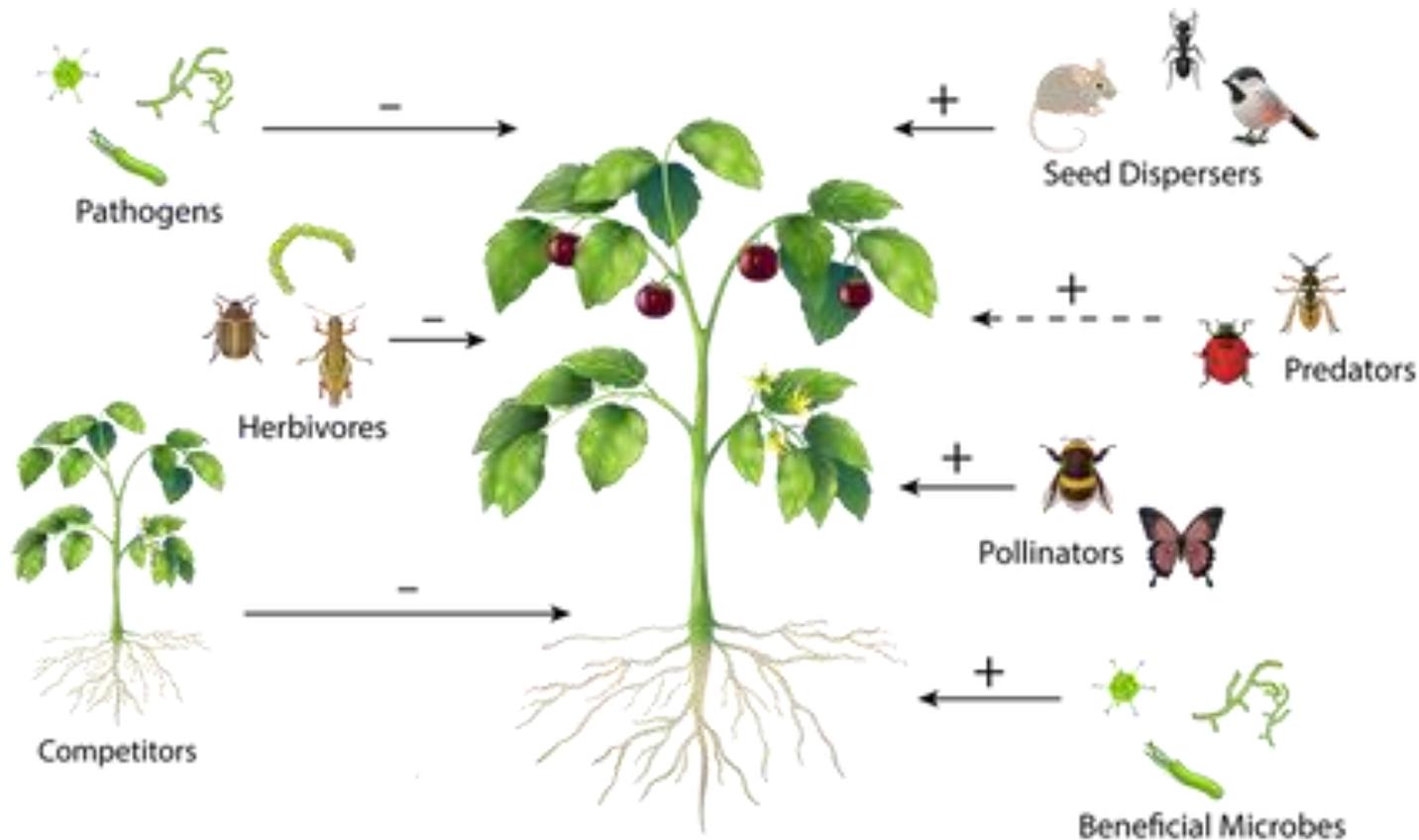
Managing for Wildlife



- Wildlife use is the result of good habitat management
 - Food
 - Shelter
 - Water
 - Mates
 - Rearing (nesting, rookeries, dens, breeding pools, etc)

*If you alter the landscape you are affecting these relationships...
whether you plan for it or not*

Basic Trophic Interactions

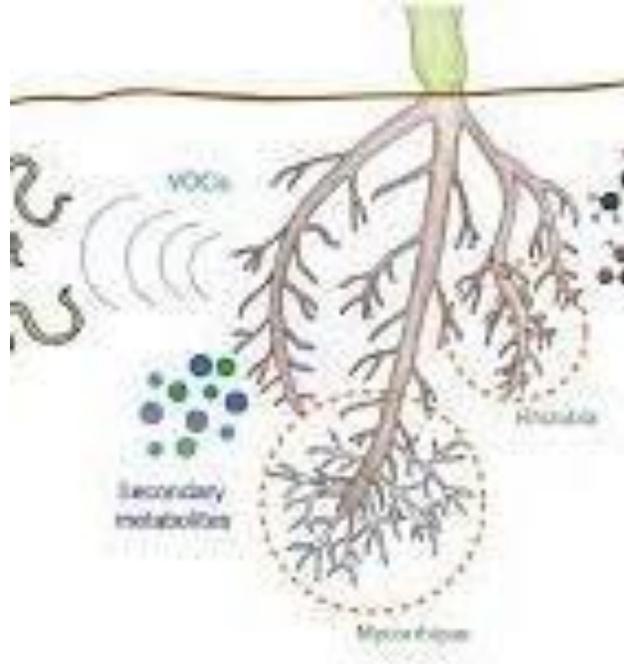
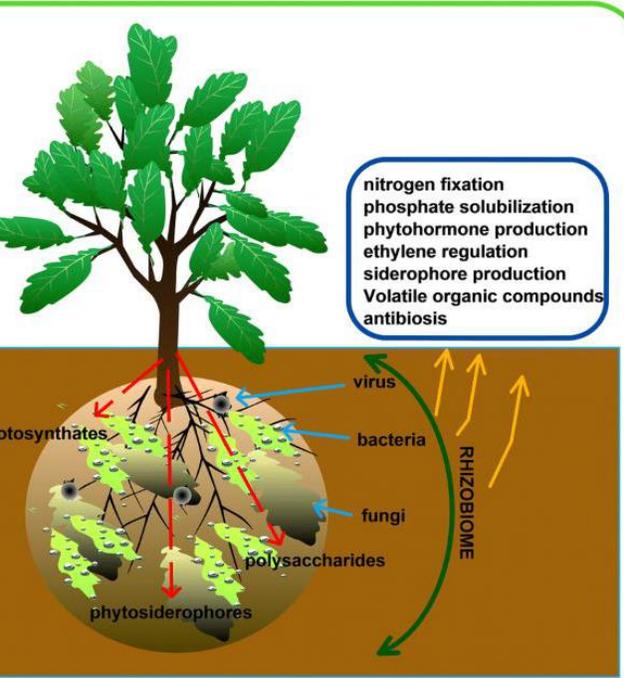


- Drives speciation
- Amazing adaptations between insects and plants
- ALL spices come from plant-animal mechanisms and responses to herbivory
- Fruits are a seed dispersal strategy
- Good habitat starts with soils....

Healthy Soils Enact Myriad Ecosystem Services

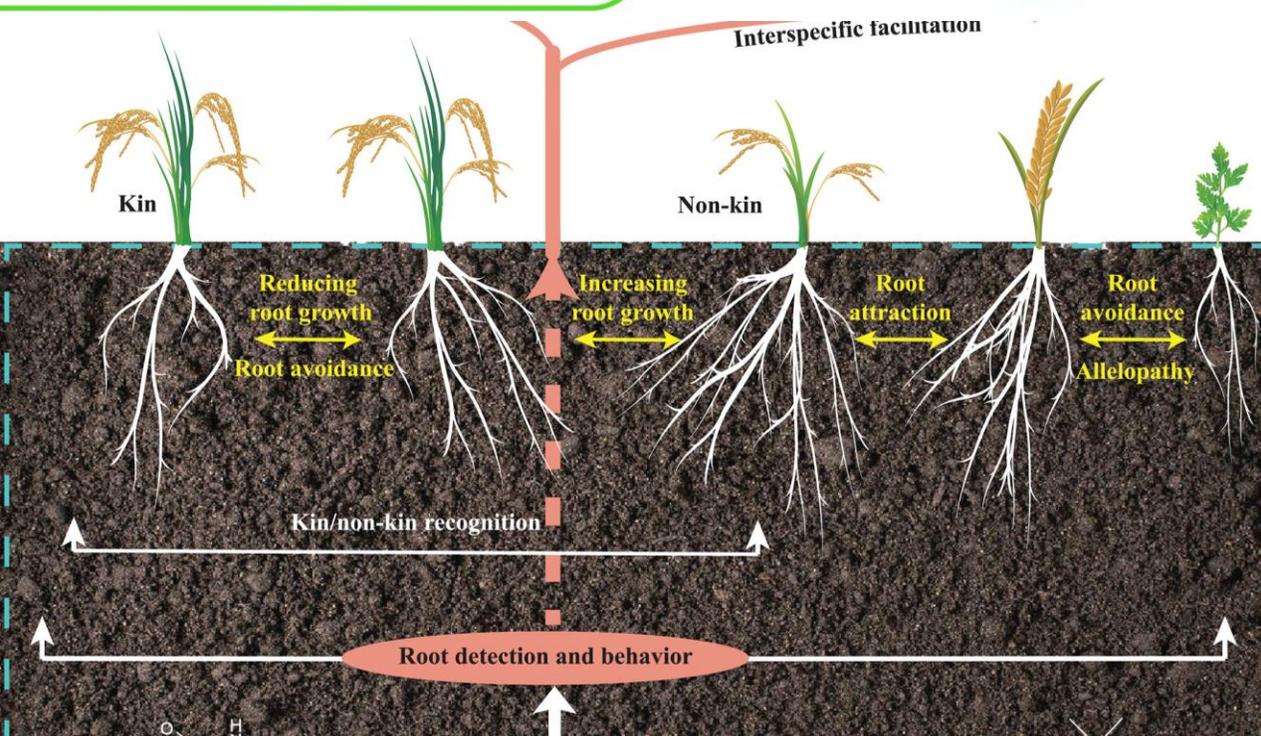
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Root Exudates

- The Nectar of the subsurface world?
- Impacts how plants interact with each other and the microbial and fungal communities
- Similar reward-based relationship with fauna
- Allelopathy



The Wood Wide Web

- Nutrient cycling, exchanges, and communication are part of a highly social, physical network of plants and fungi
- Recommended Reading – Finding the Mother Trees (Suzanne Simard)



Traditional Lawn Orogeny



- 16th Century Europe
 - Sight lines/Defense
 - “Commons” for grazing
 - Symbol of wealth and status (costly to maintain without livestock)
- North American Adoption
 - Monoculture of non-native, cool season grass
 - Used to incorporate multiple short forbs/wildflowers
 - Intolerance of “weeds”
 - Exacerbated by invention of the lawn mower (mechanical)
 - Chemical and physical manipulations
 - Suburban lifestyle – disconnection from food sources

Why is diversity important?

Why, cont'd - Economy



Video: Biodiversity is good for the economy - Institute on the Environment

Did you know that stands of trees with more species grow faster and bigger than those with fewer species? Different trees have different needs and will therefore...

ENVIRONMENT.UMN.EDU

- <http://environment.umn.edu/news/video-biodiversity-good-economy/>



Bringing these
Concepts into
your Land

Finding a Balance in the Modern Day

Challenges

- Significant (natural history) knowledge required for deliberate restoration
- So many changes that have broken the ecological balance
 - Too many deer
 - Fragmented landscapes
 - Invasives (plants and animals) are everywhere
 - Beyond societal norms
 - Finding the missing puzzle pieces....
 - Not everything that was here is appropriate to plan for

Rewards

- Nature is resilient!
- Finding missing puzzle pieces can have great return
 - Birds/wildlife
 - Oxygen, water, food
 - Joy of stewardship
 - Checks and balances to control pests
 - Soil ecosystems can be rebuilt!



Start Broad and Refine

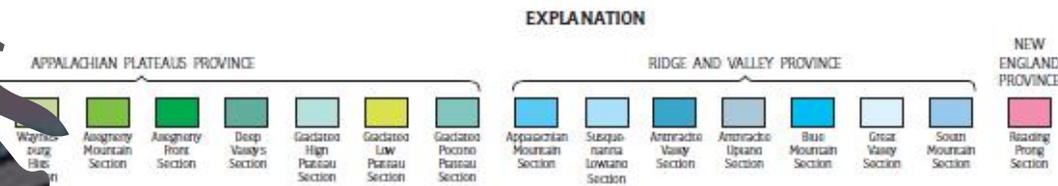
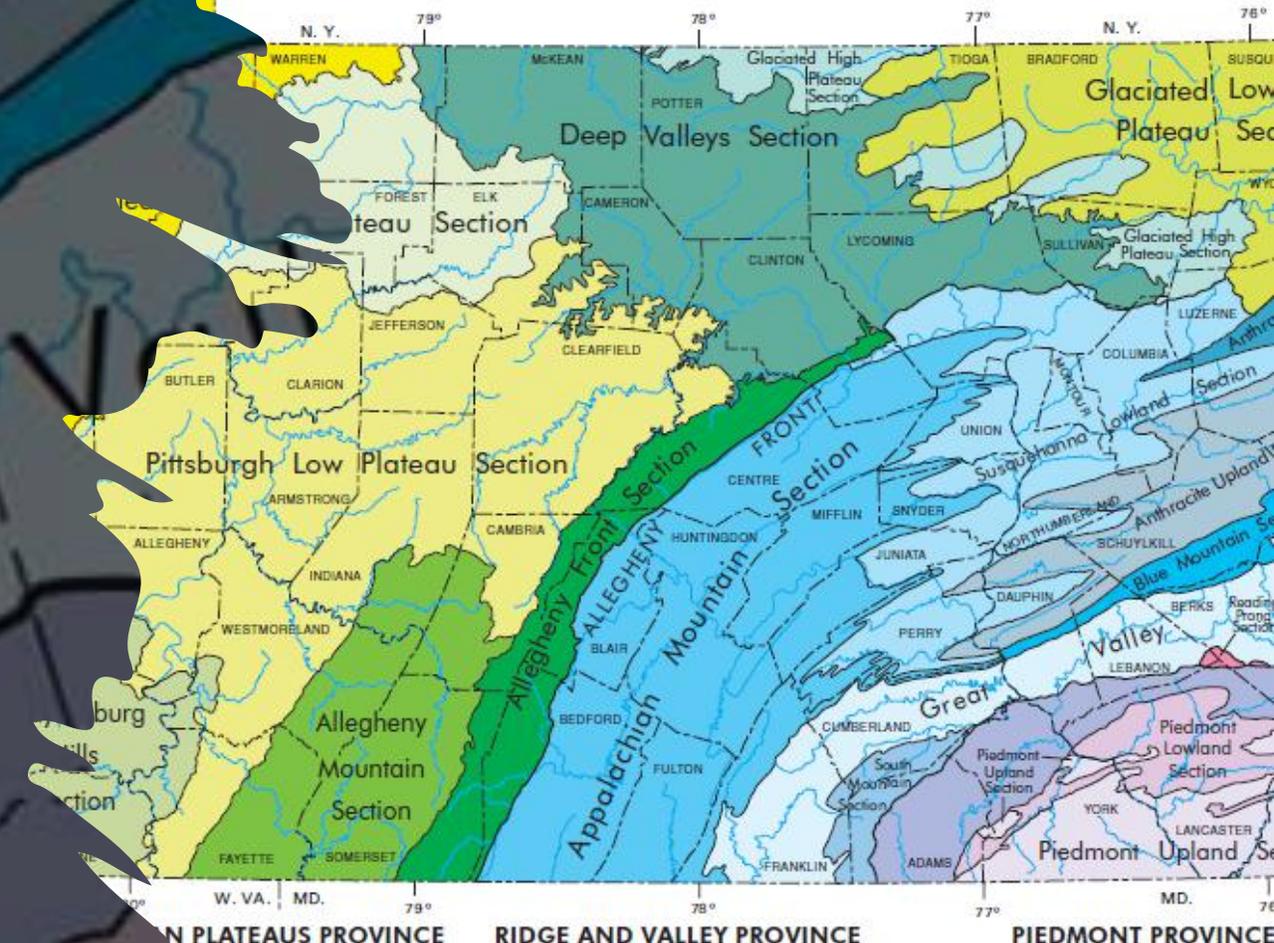
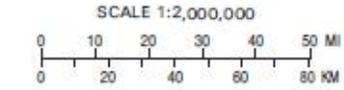
- Physiographic Province/Subsection (ex. Blue Mtn Section of RnV)
- Geology (ex. Red Sandstone)
- Soils (ex. Steep, Shallow, Stony, Sandy Loam)
- Historic Ecological Communities (ex. Virginia Pine - Mixed Hardwood Forest)
- Current Landscape Configuration (ex, aspect, connectivity to forests, near stream, etc)
- Plant Communities (Plant Lists from Known Communities)
- Aesthetic Goals (ex. Lawn for tossing the ball, wildflowers in front, more trees in backyard)
- Wildlife Goals (ex. more songbirds, attract owls, frog pond, butterflies, etc)
- Market Availability (what species are easy to buy – native plant resources)



Putting Ecological Values into Context

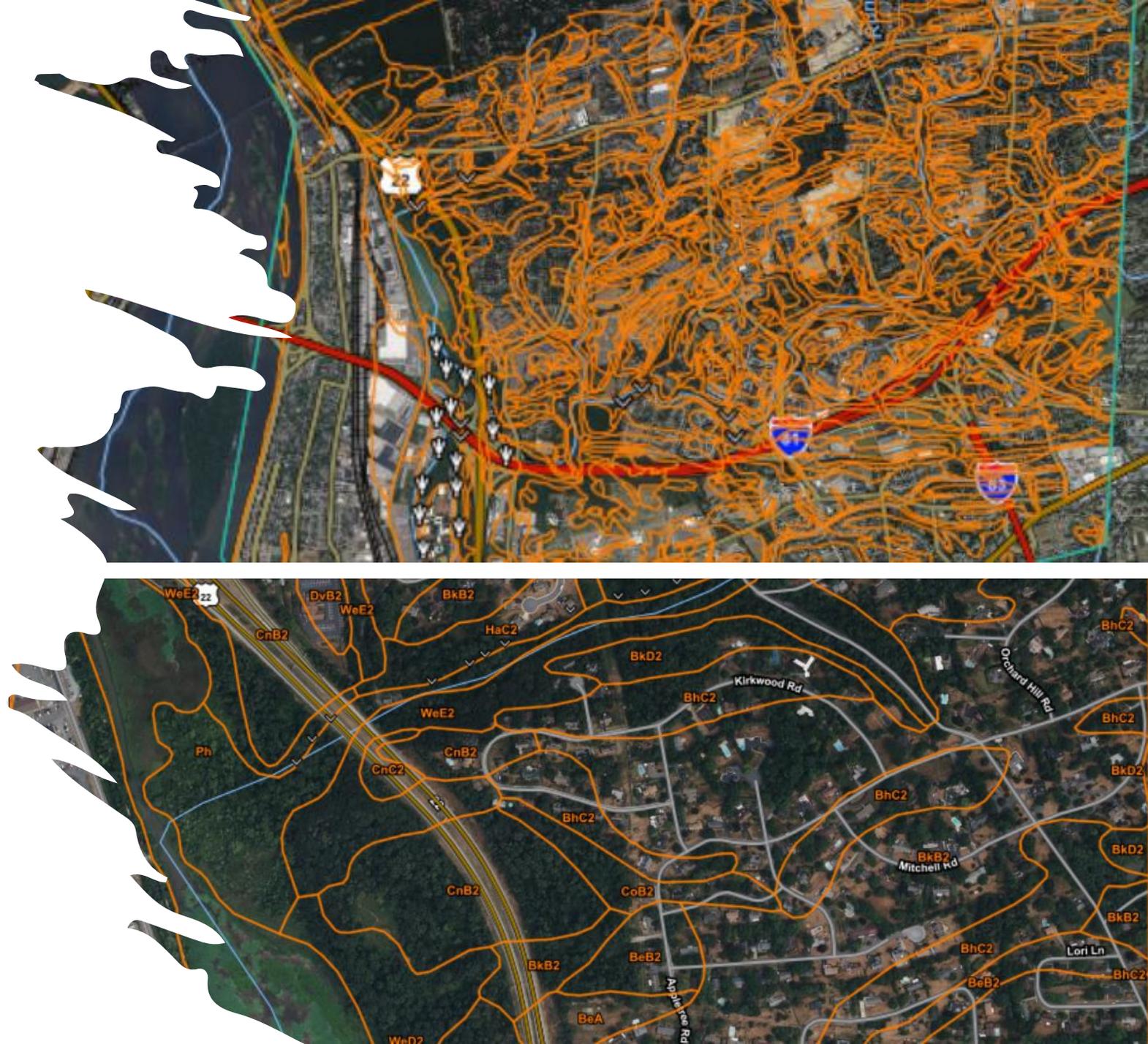
- Geology follows provinces in the region
- Ridge and Valley and Piedmont Provinces both represented
- Mix of shales, sandstones, limestone and dolomite
- Diabase intrusions and quartzite to the south
- Great Valley – very cool history!

PHYSIOGRAPHIC PROVINCES OF PENNSYLVANIA



It All Starts with Geology and Soils!

- <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>
- Check to see if you are on naturally-occurring soils or manmade or Urban soils
- Mostly loams in the region but variants for silt/sand components, depth to bedrock, and hydrology



Ecological Communities of Pennsylvania

- <https://www.naturalheritage.state.pa.us/Communities.aspx>
- Find Communities that occur in your Physiographic province and “check some boxes”
 - Ex. loam soils, SE quadrant of state, post-agricultural setting (most suburbs)

Terrestrial & Palustrine Plant Communities Of Pennsylvania By Jean Fike

Virginia pine - mixed hardwood forest

This community type most often occurs as a post-agricultural forest type on sand or silt loams, in the southeastern portion of the state. It may also occur on cleared and/or burned-over areas. *Pinus virginiana* (Virginia pine), sometimes with a mixture of other pines, e.g. *P. strobus* (eastern white pine), *P. rigida* (pitch pine), *P. pungens* (Table-Mountain pine), and less often *P. echinata* (short-leaf pine) or *P. resinosa* (red pine) contribute at least 25% of the overstory. Although this is typically a mixed type, some areas may be strongly dominated by pine. Hardwood associates vary; common species include *Quercus rubra* (red oak), *Q. velutina* (black oak), *Q. coccinea* (scarlet oak), *Q. alba* (white oak), *Prunus serotina* (wild black cherry), *Acer rubrum* (red maple), *Betula lenta* (sweet birch), *Carya* spp. (hickory), *Sassafras albidum* (sassafras), and *Fraxinus americana* (white ash). Shrubs include *Smilax* spp. (greenbrier), *Juniperus virginiana* (red-cedar), *Rhus copallina* (shining sumac), *Rubus allegheniensis* (Allegheny blackberry), *Toxicodendron radicans* (poison-ivy), and *Parthenocissus quinquefolia* (Virginia creeper). Due to the thick litter, the herbaceous layer is usually sparse, often with *Chimaphila maculata* (pipsissewa), *Pteridium aquilinum* (bracken fern), *Aralia nudicaulis* (wild sarsaparilla), *Gaultheria procumbens* (teaberry), *Desmodium* spp. (tick-trefoil), *Galium* spp. (cleavers), and various graminoids.

Related types: The "Virginia pine - mixed hardwood shale woodland" has an open canopy and is found on dry shale slopes. If the total conifer component is below 25%, consult the "Broadleaf terrestrial forest" section.

The "Serpentine Virginia pine - oak forest" differs from this type in ecology and species composition. The serpentine type occurs only on serpentinite-derived soils. *Q. stellata* (post oak) and *Q. marilandica* (blackjack oak), which are not characteristic of the more common type, are frequently found in the serpentine forest type. For a more detailed explanation of the ecology of serpentine barrens, see the description of the "Serpentine barrens complex."

Range: Piedmont, Ridge and Valley.

Selected references: Hunter and Swisher 1983, Eyre 1980.

[**Crosswalk:** Smith's "Xeric Central Hardwood - Conifer Forest," TNC's *Pinus virginiana* - *Quercus* (*alba*, *stellata*, *falcata*, *prinus*, *velutina*) Forest Alliance, SAF's Virginia pine-oak (78).]

Select Trees that Fit your Goals (and support local, native wildlife!)

- Oaks, cherry, hickory, birch, and pines

| Common Name | Plant Genus | Butterfly/moth species supported |
|--------------|-------------|----------------------------------|
| Oak | Quercus | 534 |
| Black cherry | Prunus | 456 |
| Willow | Salix | 455 |
| Birch | Betula | 413 |
| Poplar | Populus | 368 |
| Crabapple | Malus | 311 |
| Blueberry | Vaccinium | 288 |
| Maple | Acer | 285 |
| Elm | Ulmus | 213 |
| Pine | Pinus | 203 |
| Hickory | Carya | 200 |
| Hawthorn | Crataegus | 159 |
| Spruce | Picea | 156 |
| Alder | Alnus | 156 |
| Basswood | Tilia | 150 |
| Ash | Fraxinus | 150 |
| Rose | Rosa | 139 |
| Filbert | Corylus | 131 |
| Walnut | Juglans | 130 |
| Beech | Fagus | 126 |
| Chestnut | Castanea | 125 |

Understory Trees and Shrubs

- Eastern redbud (*Cercis canadensis*)
- Eastern red cedar (*Juniperus virginiana*)
- Serviceberry (*Amelanchier canadensis*)
- Black chokeberry (*Aronia melanocarpa*)
- Hackberry (*Celtis occidentalis*)
- American hazelnut (*Corylus cornuta*)
- Blueberries (*Vaccinium* spp.)
- Huckleberries (*Gaylussacia* spp.)
- Viburnums (*Viburnum* spp.)
- Elderberry (*Sambucus canadensis*)

← Excerpt from Doug Tallamy's Data





Plant – Insect Interactions

Different plants have different strategies
for preventing herbivory.....

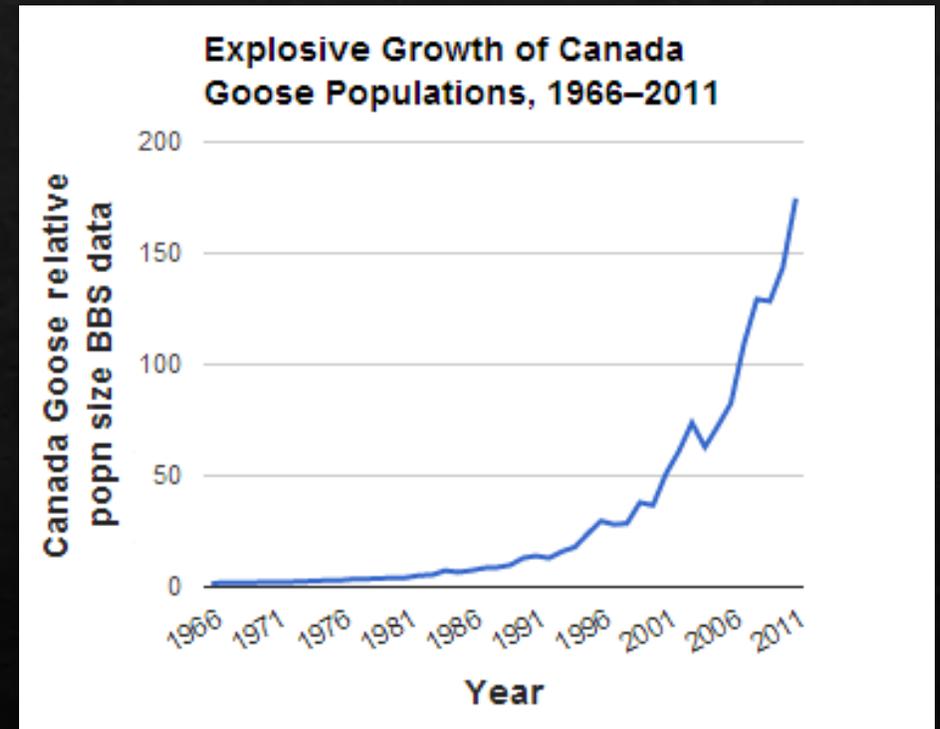
WHY Manage for Wildlife?



- Returns/Human Value
- Aesthetics
 - Mental/emotional health
 - Spiritual
 - Physical
- Ecology
 - Biodiversity/ Wildlife
 - Stewardship/ Responsibility
- Our Responsibility
 - Human mistakes....

Current Ecological Imbalances in PA

- ◇ Human-derived/human-led action or chain of events that has since resulted in loss of biodiversity and ecosystem services
- ◇ The path to hell is paved with good intentions....
- ◇ USDA wildlife management
 - ◇ 1930's – Canada goose hacking



Source: Allaboutbirds.org

Ecological Impacts

- ◇ Herbivory
- ◇ Flight Risk (social fibers)
- ◇ Feces
- ◇ Simplification (avifauna and plants)
- ◇ More than 3.32 million resident pairs



Recent USDA Mistakes



Source: Hawaii Tribune-Herald



Subsidized Hyperpredators



- ◆ Feral cat colonies kill millions of birds each year
- ◆ Likely higher number for herpetofauna (especially in Midwest and southeast)
- ◆ Despite overwhelming scientific evidence this issue persists

Source: NBC.com

Cervids in the NA Landscape

- ◆ 5 mya in fossil record (Florida)
- ◆ 3.75 mya similar to modern day deer (Kansas)
- ◆ A few species extinct that co-existed with *Odocoileus*
- ◆ Hunted by sabertooth cats, NA cheetah, and dire wolves (500 lb wolves!)
- ◆ Competition for resources by diversity of grazers (mastodon, buffalo, giant sloths, tapir, etc)



Odocoileus virginianus

- ◇ Over 30 million deer in US
- ◇ Occupies 45 states
 - ◇ Wisconsin and Pennsylvania boast highest densities
 - ◇ Deer were imported and “hacked” into areas throughout the 1900’s
- ◇ Population fluctuations and lots of uncertainty (glaciation destroyed records before 10k ya)
- ◇ Two subspecies
 - ◇ Key deer (FLA keys) and desert



Herbivory in Deer

- ◇ <https://bioone.org/journals/Natural-Areas-Journal/volume-29/issue-2/043.029.0202/Deer-Facilitate-Invasive-Plant-Success-in-a-Pennsylvania-Forest-Understory/10.3375/043.029.0202.full>
- ◇ Seasonal Dietary Shifts
 - ◇ Late Spring, Summer, and early Fall (herbaceous plants)
 - ◇ Late Fall, Winter, and Early Spring (woody plants)



Deer Physiology

- ◇ Essentially four stomachs
 - ◇ Ruminants so can digest cellulose but need to be selective
 - ◇ Choose younger shoots, terminal buds, fresh leaves
- ◇ 60 ft of small intestine
- ◇ Hollow hairs for thermal insulation
- ◇ Gaps in teeth between front incisors and molars to facilitate surgical removal of plants by tongue then sending food back to the grinding teeth (molars)



MOULTRIE

42°F

#MOULTRIECAM

03 FEB 2020 06:54 am

- ◇ Over 300 million scent receptors
- ◇ Ears 3”x6” and swivel 180 degrees
- ◇ Prey eye configuration (sides of head) = 310-degree field of view
- ◇ Eye allows 9x more light than a humans
- ◇ tapetum lucidum – reflective layer behind the retina that allows for the same light to be used twice
- ◇ More rods (night vision capabilities)
- ◇ Less cones (cant see reds and oranges, but see blues and greens, aka dinner, better). UV brighteners in detergent make us stand out like light bulbs 😊

A History of Poor Policies on a Foundation of Invasive Culture

- ◇ <https://dnr.wi.gov/topic/hunt/documents/deer4page.pdf>
- ◇ From 500k deer in 1900 to 30 million in early 2000's
- ◇ Active persecution of natural predators continues
- ◇ Active subsidence of populations via food plots, sweet corn and soy methods, lawn/suburban aesthetic, etc
- ◇ From 5 deer per square mile to 35
 - ◇ "Pre-European" - needs to be unpacked but significant CULTURAL shift in land use supported... and still supports.... ecological imbalances
- ◇ 1.5 million car crashes with deer
- ◇ 1.1 billion in vehicle damage and over 15k people injured annually
- ◇ 750 mil annual damage to timber industry
- ◇ Areas without hunting show significant forest health issues
 - ◇ No tree and shrub regeneration
 - ◇ Loss of native diversity
 - ◇ Proliferation of invasive plants
 - ◇ Loss of amphibian diversity
 - ◇ Loss of breeding bird diversity and abundance

Stats from Al Cambronne's Deerland: Americas Hunt for Ecological Balance and the Essence of Wilderness

Deer Exclusion Proves Impacts!



Just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades.”

Aldo Leopold's Essay - "Thinking Like a Mountain"

The Sum of Parts....

- ◆ Separate issues, such as deer mismanagement, invasive species introductions (both accidental and intentional), pulses of logging intensity, and “modernization” of agricultural technology have shifted the ecology at a systematic and landscape scale rather than localized impacts



Source: Hay and Forage Magazine

Microstegium vimineum



- ◇ Introduced in 1919 in Tennessee as packing material for Chinese porcelain
- ◇ Fast growing annual with shallow roots outcompetes native seeds
- ◇ Produces up to 1,000 seeds per plant (3 year viability)
- ◇ Thrives in disturbed soils and freshly cleared areas (deer eat the natives and this colonizes!)
- ◇ Primary dispersal is water, mammals and machinery (ex. rain, creeks, hikers' treads, deer hooves, tire tracks)

Source: Alabama Cooperative Extension

Elaeagnus umbellata



Source: Virginia Tech



Source: Good Life Revival

- ◇ First introduced in the 1830's
- ◇ Was promoted and given away to landowners by Soil Conservation Districts for 40 years!
 - ◇ Ex. Trexler Preserve....
- ◇ Very facultative
- ◇ Leaf shoots early and retains late
 - ◇ Flowers and produces berries by year three
- ◇ Produces hundreds of berries each year
 - ◇ Strategy for dispersal and germination in bird and mammal guts

Amur Honeysuckle (*Lonicera maackii*)



Source: IUPUI

- ◇ 1898 at NYBG.... Has destroyed millions of acres of forest, supported untold tons of soil loss, and destruction of the forest floor ecology
- ◇ <https://www.si.edu/stories/escape-invasives>

The tide of invasives....

- ◇ Is imbalance the new norm?
- ◇ What tends to adapt and adjust?
 - ◇ Saw-whets in honeysuckle thickets...
- ◇ Who is losing? Is fighting futile? What are we saving?
 - ◇ Loss of so many nesting neotropical birds
- ◇ Will these plants ever be “checked”?
 - ◇ *Phyllocoptes fructiphilus* on *Rosa multiflora* causing Rose Rosette Disease
- ◇ Long-term research needed, but strong evidence of ecological collapse and direct extirpation of multiple taxa (fungi, microbes, insects, arthropods, fish, reptiles, amphibians, mammals, and birds)



Source: All About Birds

Solutions?

- ◇ How do we decide which battles to fight?
- ◇ What do we do about earthworms?
- ◇ Where does intelligent tinkering start when there are so many cogs and wheels missing... and new cogs that don't fit?
- ◇ Can Ecological Restoration and Designing with Nature help Create a Land Ethic in NE US?
- ◇ Are we learning about how these



Source: IntheHills.ca

Find a Good Nursery!

Landscape Plugs

- North Creek Nursery
- Taylor Creek Nursery
- Pinelands Nursery

Seeds

- Taylor Creek Nursery
- Ernst Nursery

Trees and Shrubs

- Octoraro Native Plant Nursery
- American Native





ia hirta-32
 ia laciniata-32
 yrium scoparium-50
 laciniatum-32
 flexicaulis-32

| | | | |
|------------------------------------------------|---------|---------|----------|
| HIBMOS-32 - Hibiscus moscheutos-32 | \$ 1.45 | 16 (32) | \$ 23.20 |
| LIASCN-32 - Liatris scariosa nieuwlandii-32 | \$ 1.35 | 32 (32) | \$ 43.20 |
| LOBCAR-50 - Lobelia cardinalis-50 | \$ 1.00 | 25 (50) | \$ 25.00 |
| LOBSIP-50 - Lobelia siphilitica-50 | \$ 1.00 | 25 (50) | \$ 25.00 |
| MERVIR-32 - Mertensia virginica-32 | \$ 2.55 | 32 (32) | \$ 81.60 |
| MIMRIN-32 - Mimulus ringens-32 | \$ 1.06 | 8 (32) | \$ 8.48 |
| MONFIS-50 - Monarda fistulosa-50 | \$ 1.00 | 50 (50) | \$ 50.00 |
| MONPUN-32 - Monarda punctata-32 | \$ 1.15 | 32 (32) | \$ 36.80 |
| OPUHUM-BR - Opuntia humifusa-pad | \$ 1.25 | 10 BR | \$ 12.50 |
| PACAU-32 - Packera aurea-32 | \$ 1.06 | 16 (32) | \$ 16.96 |
| PANVIR-50 - Panicum virgatum-50 | \$ 1.00 | 25 (50) | \$ 25.00 |
| PENDIG-50 - Penstemon digitalis-50 | \$ 1.00 | 25 (50) | \$ 25.00 |
| PHLPAN-32 - Phlox paniculata-32 | \$ 1.45 | 16 (32) | \$ 23.20 |
| PHYVIA-32 - Physostegia virginiana arenaria-32 | \$ 2.55 | 32 (32) | \$ 81.60 |

Graw Personal Order

| Payment Terms | FOB Point | Carrier | Ship Service | Requ |
|---------------|-----------|-------------|--------------|------|
| NET 30 | Origin | Best Method | | |

| Number / Description | Unit Price | Qty Ordered | Total Price |
|-----------------------------------------|------------|-------------|-------------|
| 1 - Allium cernuum-50 | \$ 0.95 | 50 (50) | \$ 47.50 |
| 12 - Andropogon gerardii-32 | \$ 1.15 | 32 (32) | \$ 36.80 |
| 1 - Andropogon virginicus-50 | \$ 1.00 | 50 (50) | \$ 50.00 |
| 12 - Anemone canadensis-32 | \$ 1.45 | 16 (32) | \$ 23.20 |
| 32 - Aquilegia canadensis-32 | \$ 1.28 | 32 (32) | \$ 40.96 |
| 1 - Asclepias incarnata-50 | \$ 0.95 | 25 (50) | \$ 23.75 |
| 1 - Asclepias syriaca-32 | \$ 1.45 | 16 (32) | \$ 23.20 |
| 2 - Asclepias tuberosa-32 | \$ 1.25 | 64 (32) | \$ 80.00 |
| - Asclepias viridis-32 | \$ 1.30 | 16 (32) | \$ 20.80 |
| 1-32 - Baptisia australis var. minor-32 | \$ 1.45 | 16 (32) | \$ 23.20 |
| 50 - Bouteloua curtipendula-50 | \$ 0.95 | 50 (50) | \$ 47.50 |
| 2 - Chasmanthium latifolium-32 | \$ 1.15 | 16 (32) | \$ 18.40 |
| 2 - Chelone obliqua-32 | \$ 1.45 | 16 (32) | \$ 23.20 |
| 32 - Conoclinium coelestinum-32 | \$ 1.20 | 32 (32) | \$ 38.40 |
| 1 - Coreopsis tripteris-32 | \$ 1.06 | 32 (32) | \$ 33.92 |
| 0 - Echinacea purpurea-50 | \$ 0.95 | 50 (50) | \$ 47.50 |
| 1 - Elymus hystrix-50 | \$ 0.95 | 25 (50) | \$ 23.75 |
| 1 - Eryngium yuccifolium-50 | \$ 0.95 | 25 (50) | \$ 23.75 |

Brodhead, WI 53520
 Phone: 608-897-8641
 Email: taylorcreek@res.us

| Number / Description | Unit Price | Qty Ordered | Total Price |
|---------------------------------------------|------------|-------------|-------------|
| SOLSPE-32 - Solidago speciosa-32 | \$ 1.15 | 16 (32) | \$ 18.40 |
| SPIALB-32 - Spiraea alba-32 | \$ 2.55 | 16 (32) | \$ 40.80 |
| SPITOM-32 - Spiraea tomentosa-32 | \$ 1.75 | 16 (32) | \$ 28.00 |
| SPOHET-32 - Sporobolus heterolepis-32 | \$ 1.06 | 16 (32) | \$ 16.96 |
| SYMLAE-32 - Symphyotrichum laeve-32 | \$ 1.15 | 32 (32) | \$ 36.80 |
| SYMLAN-32 - Symphyotrichum lanceolatum-32 | \$ 1.15 | 16 (32) | \$ 18.40 |
| SYMLAT-32 - Symphyotrichum lateriflorum-32 | \$ 1.15 | 16 (32) | \$ 18.40 |
| SYMNOV-32 - Symphyotrichum novae-angliae-32 | \$ 1.05 | 32 (32) | \$ 33.60 |
| SYMPUN-32 - Symphyotrichum puniceum-32 | \$ 1.15 | 16 (32) | \$ 18.40 |

The McGraw Meadow....started May 2021
 62 species – 1,600 plugs



Early June 2021



Early June 2021



July 2021



Butterfly Milkweed and Horsemint



White Oak and Wasp species on
Horsemint (July 2021)



Cardinal Flower and Sunflowers in
August 2021



Rain Garden and Monarch in
September 2021



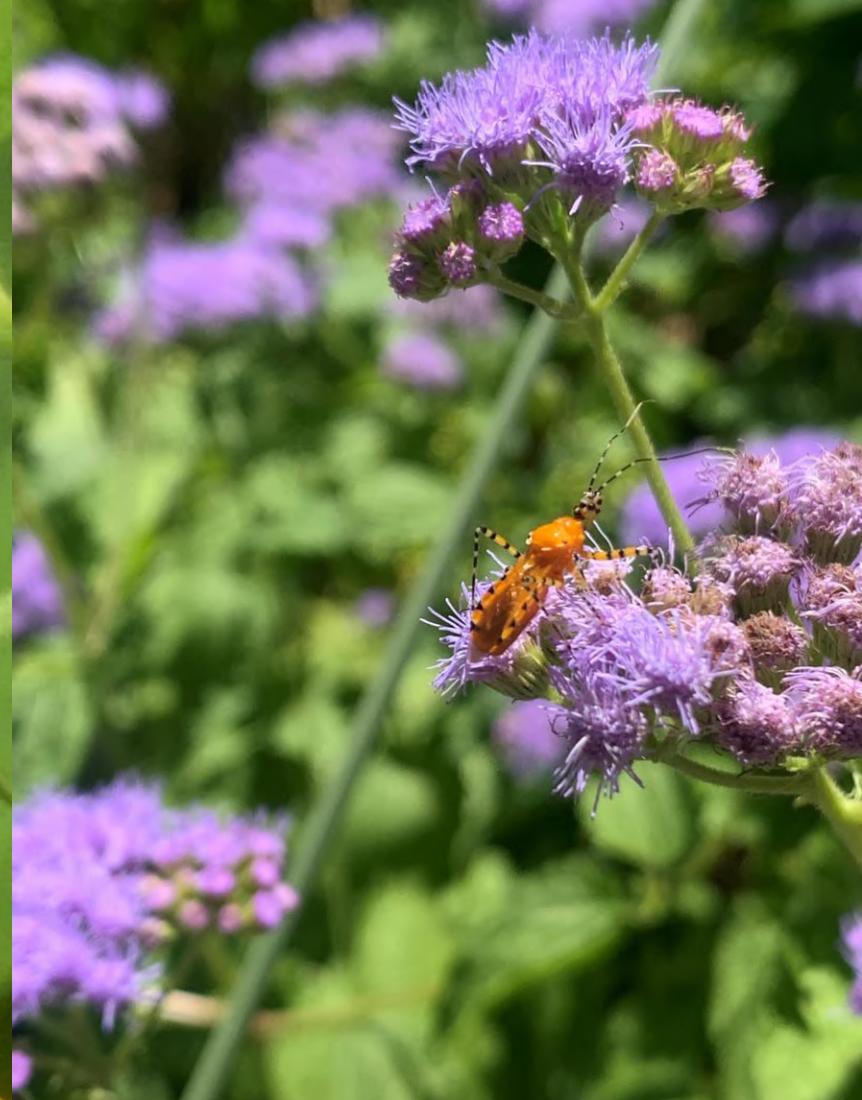
October 2021 (toot toot!)



May 2022 (12 months after planting)



July 2022 (14 months after planted)



By Spring 2022 Over 75 New Native
Insect Species!



August 2022



September 2022



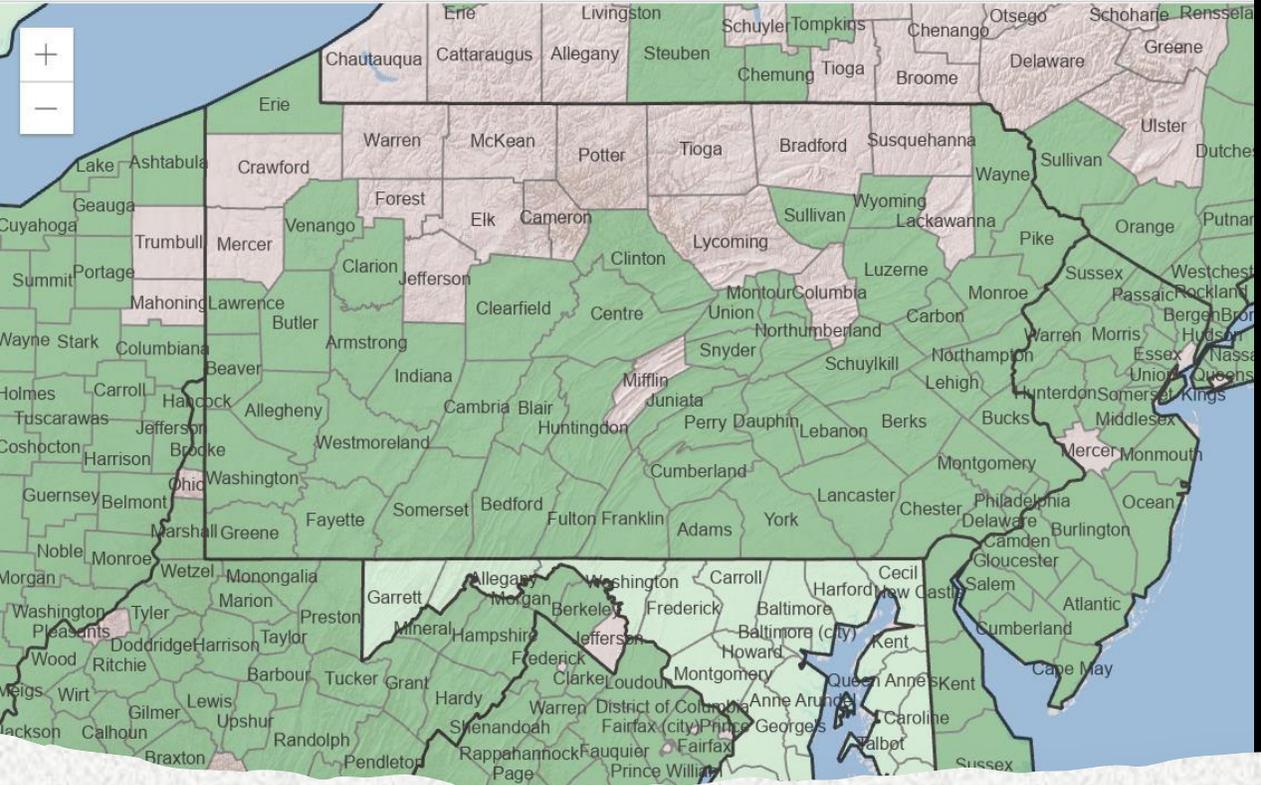
September 2022 – My New Therapy!

Planning for Your Property

- Lean on Ecological Communities of PA
- Cross Reference USDA Plants Database for your County
- <https://plants.usda.gov/home>

| Common Name | Plant Genus | Butterfly/moth species supported |
|------------------|---------------|----------------------------------|
| Goldenrod | Solidago | 115 |
| Asters | Aster | 112 |
| Sunflower | Helianthus | 73 |
| Joe pye, Boneset | Eupatorium | 42 |
| Morning glory | Ipomoea | 39 |
| Sedges | Carex | 36 |
| Honeysuckle | Lonicera | 36 |
| Lupine | Lupinus | 33 |
| Violets | Viola | 29 |
| Geraniums | Geranium | 23 |
| Black-eyed susan | Rudbeckia | 17 |
| Iris | Iris | 17 |
| Evening primrose | Oenothera | 16 |
| Milkweed | Asclepias | 12 |
| Verbena | Verbena | 11 |
| Beardtongue | Penstemon | 8 |
| Phlox | Phlox | 8 |
| Bee balm | Monarda | 7 |
| Veronica | Veronica | 6 |
| Little bluestem | Schizachyrium | 6 |
| Cardinal flower | Lobelia | 4 |

Data from Doug Tallamy



Basic Search

 Scientific Name

- Characteristics Search
- Duration Search
- Fact Sheets/Plant Guides
- Group Search
- Growth Habit Search
- Image Search
- Invasive/Noxious Search
- Rarity Search
- State Search
- Wetland Search

You are here: [Home/Plant Profile](#)

- [General](#)
- [Images](#)
- [Subordinate Taxa](#)
- [Related Links](#)
- [Wildlife](#)
- [Sources](#)

Asclepias tuberosa L.

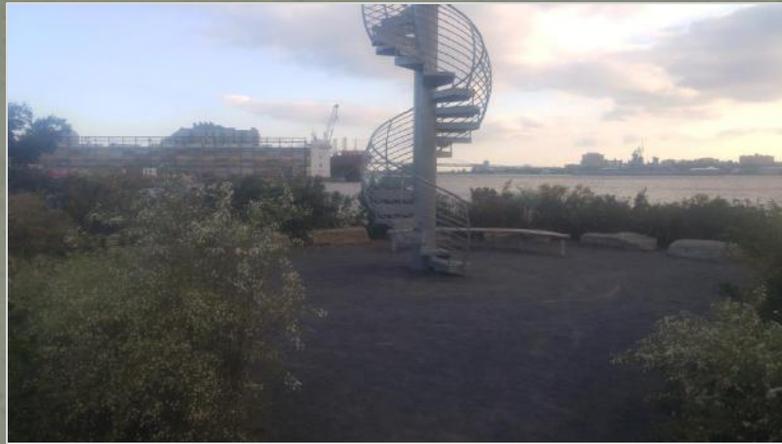
butterfly milkweed



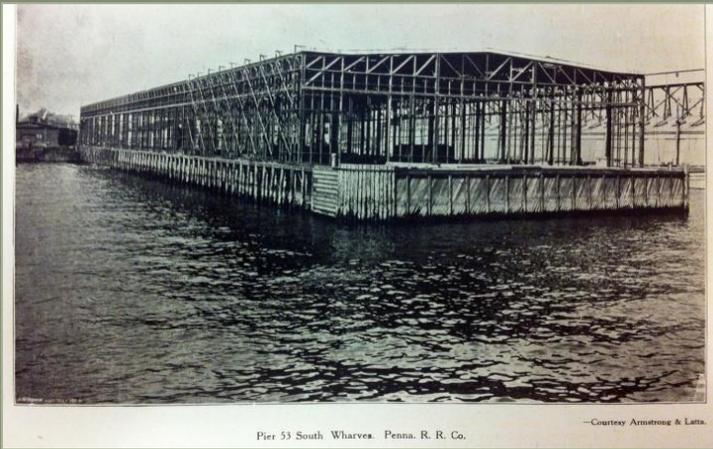
| General Information | |
|-----------------------------------------------|----------------|
| Symbol: | ASTU |
| Group: | Dicot |
| Duration: | Perenn |
| Growth Habit: | Forb/h |
| Native Status: | CAN N L48 N |
| Plant Guide (doc) (pdf) (pdf) | |

USDA Website

An Urban Setting and Small Scale



Washington Avenue Pier



- Historical Research
 - 1870's Immigration Port
 - Industrial Uses
 - Abandoned in 1970's
 - Soils are all fill
 - Concrete, brick, and wooden cribbing



Washington Avenue Pier

- Existing Conditions
 - Small, manmade footprint
 - Heavy soil compaction
 - Homeless camp
 - Non-native trees
 - Limited herb/shrub layers
 - Dangerous holes and broken crib

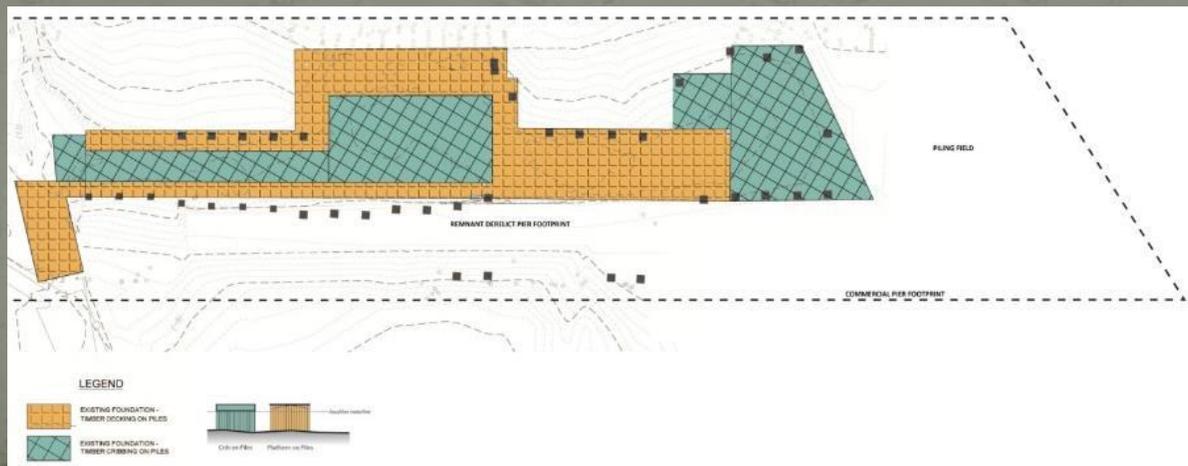


Washington Avenue Pier



- Collect Data
 - Hydrology/Water
 - Vegetation
 - Birds
 - Herpetofauna
 - Fish
 - Insects
 - Critical Habitats?

CREATE!



Washington Avenue Pier



- Grading
- Retaining Wall
- Soil Lifts
- Matting
- Seeding
- Plugs
- Containerized and B&B woodies

Constructed



Constructed



Robust Vegetation/Habitat



Repeat the
Surveys!



Results



Wash Ave Summary Monitoring Data (2018)



Flora

CURRENT

- 173 Species
- 161 native species (12 non)
 - 55 Woody
 - 93 herbaceous
 - 25 graminoid

PRE-CONST

- 49 Species
- 32 native species (17 non)
 - 24 Woody
 - 22 Herbaceous
 - 3 Graminoid

5x increase in Natives
Invasives less than 7% (prev. 35%)

Fauna

- 101 bird species (66)
- 12 herpetofauna (6)
 - 6 turtles
 - 3 snakes
 - 2 frogs
 - 1 lizard
- 9 mammals (5)
- 72 insects (16)
 - Dragonflies/damselflies
 - Solitary bees
 - Lepidoptera
 - Coleoptera

Dramatic increase in pollinators
Noticeable increase in breeding birds
Refugia for herpetofauna?

Conservation Value

Understanding what small-scale ecosystem restoration can look like in the city which;

offers city residents an “escape” from the urban setting

creates conservation at a scale (often) less appreciated

stimulates ideas for plant selections that peeps can grow in their own yards (row-home/mini-yard friendly)

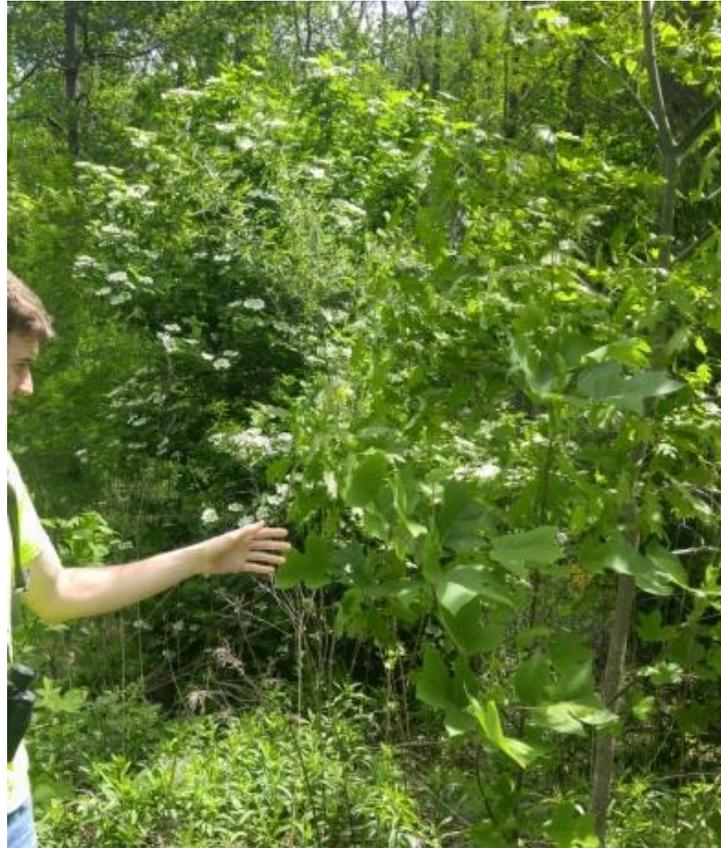
creates a green space not centered around active recreation (limited in the city) – allowing stakeholder representation

provides critical habitat for a variety of species not commonly found in the city



Five Acre Lot in Suburbs
(MontCo) – SEED ONLY

Edge Softening with the “forgotten” habitat type



- Shrub/scrub and “teenage” forests are increasingly rare
 - Autogeny... broken
- Results in the semi-nomadic species that depend on these habitats to be rare
- Research at Longwood Garden revealed importance of these edges

Start Your Own Native Plant Nursery!



Takeaways



- Minimize monoculture lawn space!
- Clean/mow meadows in early spring
- Allow for dead standing material to remain as long as possible in the winter
- Leave leaves or create mulch pile(s) in the yard
- Be patient and take notes



- Plant natives whenever possible
- Seed and Berry producers
- Deer Resistant?
- Seasonal protections
- Invasive Species will appear... know your bad plants and weed them out!





Questions/Discussions

Thank you!

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