

# Building Biodiversity at Home

Fighting Climate Change One Backyard at a Time

Willow Cheeley

# Spoiler Alert

It's on us

Climate Change due to human activity is real

Overloading the atmosphere with  
greenhouse gases

Altering patterns and processes at a pace  
faster than adaptation

Decreasing biodiversity and accelerating  
extinction



*John McColgan 2000*

*Image: John McColgan; Courtesy: APOD*

# Take Action

Get up and into your backyard

Biodiversity

Reading your landscape

Increase Eco-Literacy

Increase Design Literacy

Some backyard examples

Easy native seeds to start this fall – tomorrow!



check this space for additional information

# Biodiversity

## Species Diversity

Number and relative abundance of species that live in a location

## Genetic Diversity

Range of different inherited traits, critical for adaptation

## Ecosystem Diversity

Range of ecosystems in a location (wetland, grassland, forest, etc.)

## Functional Diversity

Helps discriminate what role species are playing in the ecosystem

### Interdependent Network of Relationships

Increases long term stability

Mitigates climate changes

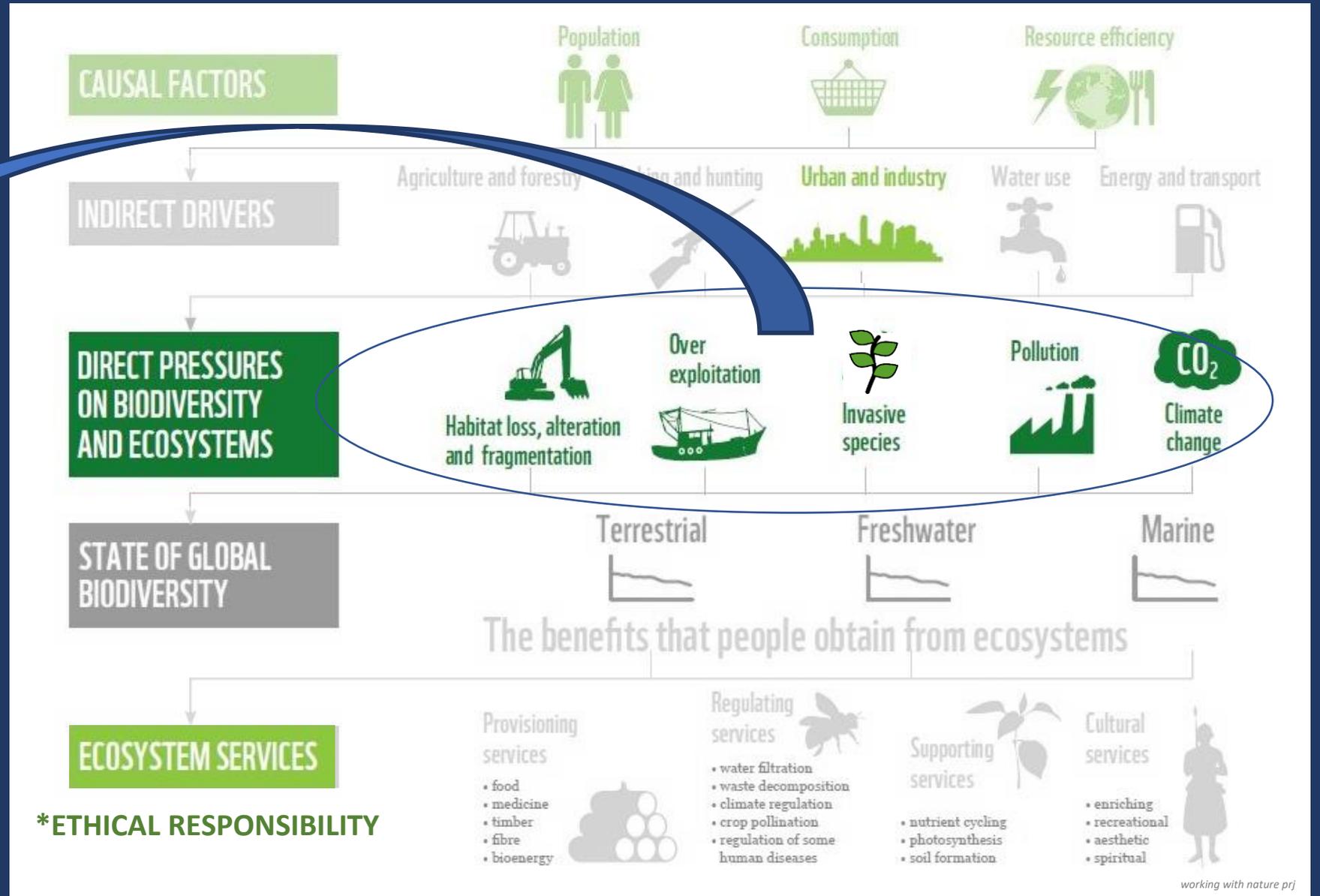
Has intrinsic worth



# What's Contributing to Loss of Biodiversity?



Our Backyards



# Biodiversity is not a priority in typical suburban design

## Suburban Landscape Design – English and European Influences

Dualism – Man vs. Nature

Conspicuous consumption

Status, Stasis and Control  
outdoor “rooms” for display only

How it looks and how we’re perceived

Short-term trendy products & styles

Behaviors, practices and industries developed  
to support this system (and lots of lawn)



1540's Hampton Court King Henry VIII

W. Cheeley



# Our backyards are shaped by our values and experiences

When we're king or queen of our castle, we can end up perpetuating the problem without realizing it. A blank space filled with isolated elements that may kind of work together visually, but not functionally. When we learn our ABC's from interior design alone, biodiversity is the last priority.



# Our Backyards

These individual decisions have spread, to rapidly form a pattern on increasingly larger scales and we're experiencing the consequences



What's in our backyard – and front yard?

If we were to remove the canopy layer on Google that makes Andover look green from above, would this be our dominant local ecosystem?



No matter where we live, we can build biodiversity around our homes and in our communities

# Our Backyards

Our landscapes are shaped by our values and experiences



Beware the myth of the “blank slate” or paradise lost – people have lived here for thousands of years and we can all participate more responsibly and fully in our landscapes



Swinomish clam garden restoration



# Our Backyards can be Built for Biodiversity

*“...can we all, understand the Skywoman story not as an artifact from the past but as instructions for the future? Can a nation of immigrants once again follow her example to become native, to make a home?”*

## Ecological or Regenerative Design – Indigenous and Conservation Movement Influences

Long-term processes

Linkages and layers

All Beings

Biodiversity and native species integral

Adaptation and change

Persistence

Behaviors and practices that support this system



Sissinghurst Castle Garden, UK



Increase our Eco-literacy

If we have a self-central world view

Start by understanding ourselves as part of a bigger system



# Increase our Eco-literacy – start learning to read the landscape

If you knew 3 things about the Great Golden Digger Wasp...



1. Solitary, so she's not aggressive, and only lives 1-2 months as an adult
2. She digs her nest in the ground, all by herself, and creates underground chambers where she lays her eggs. Her babies are born and live underground in the backyard before emerging as adults.
3. She visits flowers for nectar and pollinates, but she also hunts insect prey like katydids and crickets keeping their populations in check. She stuns them and leaves them in the chambers for her babies to eat when they hatch. She's a great Mom!

...what would you change in your yard?

*"Of the roughly 3600 species of bees in North America, more than 90 percent lead solitary rather than social lives with each female constructing and provisioning her own nest without any help from other members of her species." xerces.org*

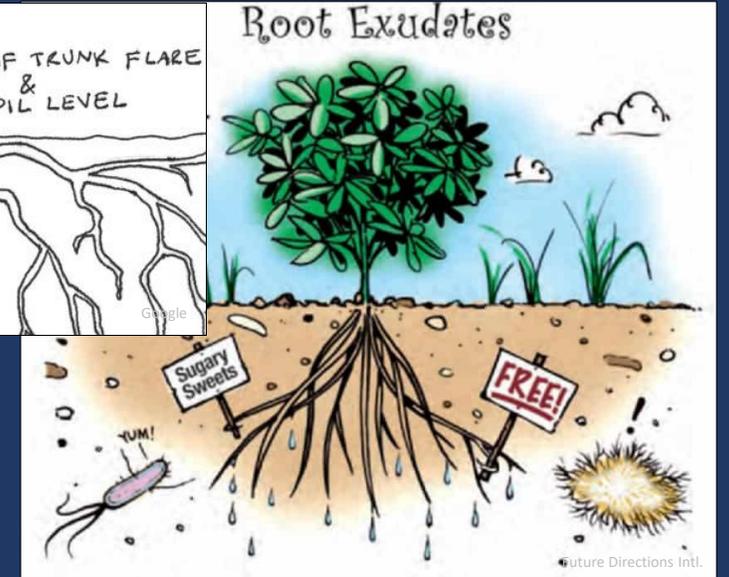
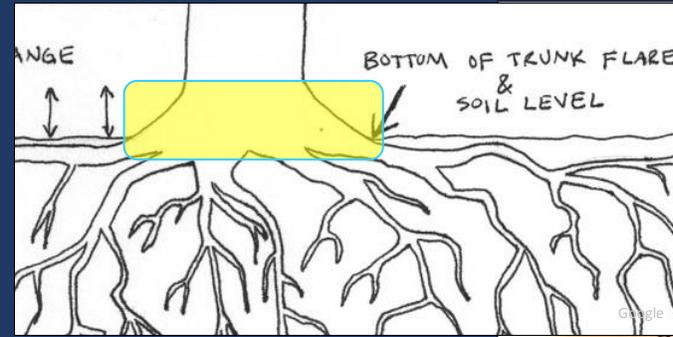


# Increase our Eco-literacy

If you knew 3 things about a tree's root system...

1. The trunk flare is a transition zone where oxygen exchange occurs. Tree roots also put out carbohydrates into the soil to attract soil organisms into the area, who then stay and release soil nutrients for the tree – the tree can also alter pH this way. This is active symbiosis.
2. When the trunk flare is buried the tree suffocates, health declines (like dieback in the crown); the tree isn't functioning very well and won't live as long
3. Tree roots can become permanently disfigured if not grown properly; Roots circle and as they grow and expand, choke the tree to shorten its life span- this is what you purchase from a nursery

...what would you change in your yard?



# Increase our Eco-literacy



Do you *have* to have that “Insta-Tree” in your backyard?



W. Cheeley



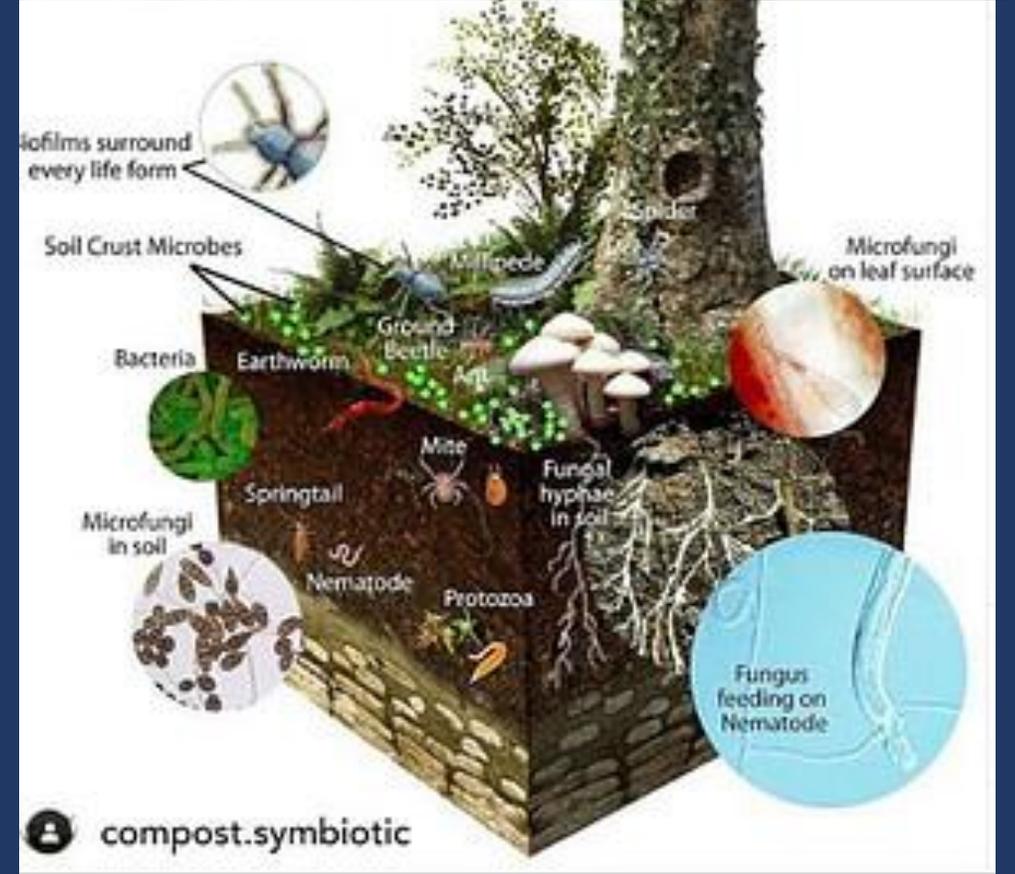
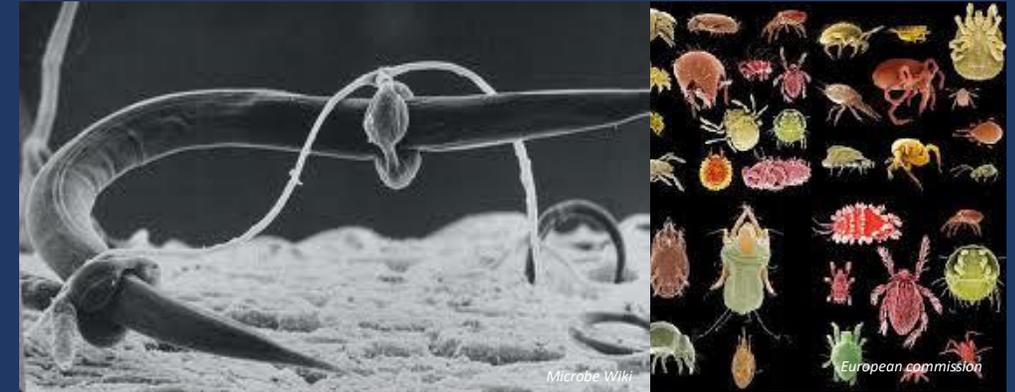
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# Increase our Eco-literacy

If you knew 3 things about your soil...

1. Healthy soil is an incredible miniature diverse ecosystem with predators and prey, we just don't pay attention, with different species are playing similar roles in nutrient cycling
2. Plant roots are part of an amazing interdependent network that is integral to healthy soil ecosystems, forming symbiotic relationships with other organisms
3. Compaction, chemicals, over-tilling, bad compost, can impact biodiversity within this soil ecosystem; earthworms aren't native to New England and the most recently introduced earthworm species are disrupting nutrient cycling in forests

...what would you change in your yard?



How would you read these landscapes?

Mama Wasp, Trees, Soil Life



# Increase our Eco-Literacy

## Start Tomorrow

Compare and contrast our yards with local Conservation land

Take a phone and take notes:

Learn the names of everything on that hiking trail

Learn the names of everything in our yard

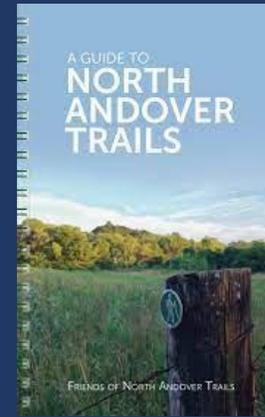
What native species would add biodiversity to the backyard?

In the Zoom era webinars are more accessible than ever

Google Scholar

Participate in Citizen Science

we can add data to studies using iNaturalist



Google Scholar search results for "golden digger wasp kleptoparasitism". The search shows about 145 results. A result from J. Bentinen and E. Preisser (2009) is visible, discussing avian kleptoparasitism of the digger wasp *Sphex pensylvanicus*.

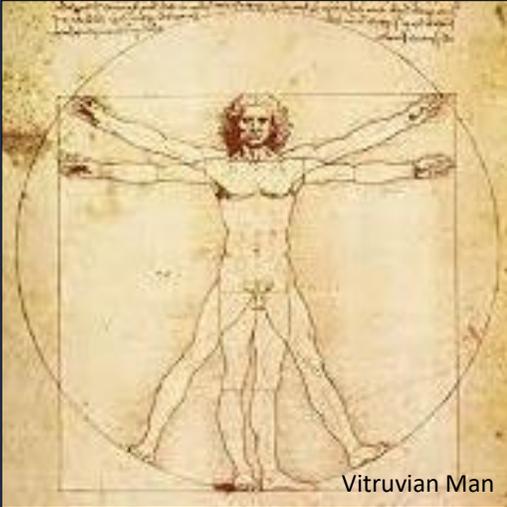
THE OHIO STATE UNIVERSITY COLLEGE OF FOOD, AGRICULTURAL AND ENVIRONMENTAL SCIENCES BEE LAB  
Education, research and outreach related to honey bees, wild bees and other pollinators

Navigation: HOME, WORKSHOPS & WEBINARS, RESEARCH, OHIO LINKS, HONEY BEE RESOURCES, NATIVE BEES, PLANTS, NEWS

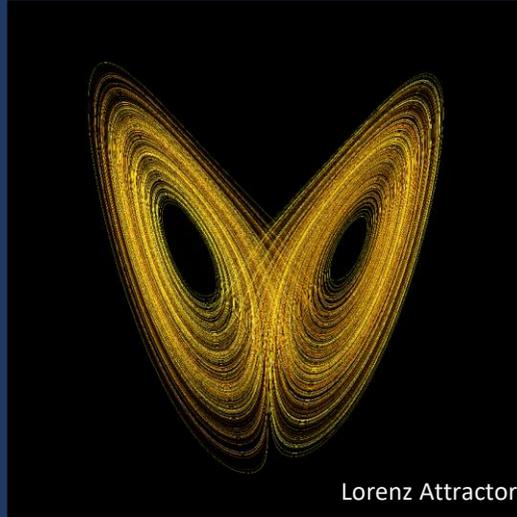
Webinars, Workshops and Short Courses  
OSU Bee Lab Pollinator Webinars  
Ongoing:  
[The Bee Short Course for Community Scientists: building skills of community scientists interested in wild bee conservation.](#)  
Monthly webinars from May to November 2021



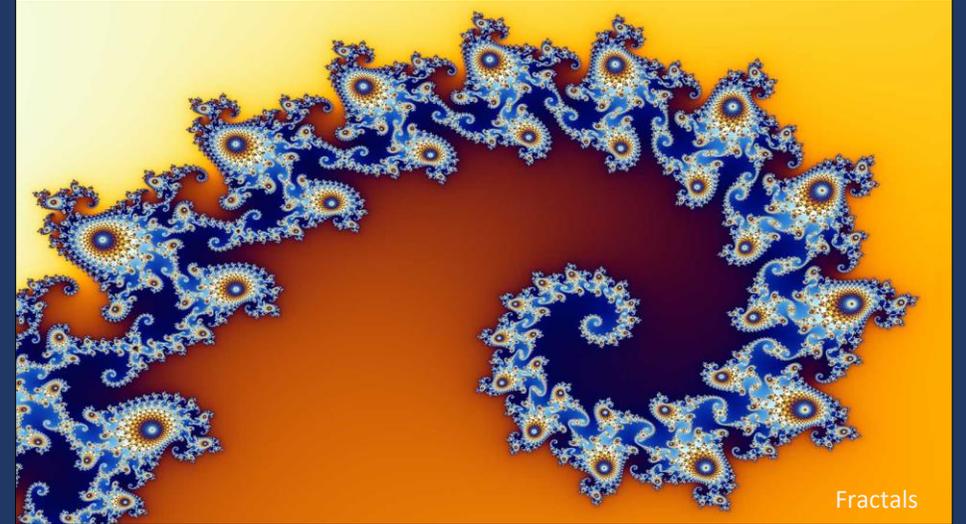
# Increase our Design Literacy – start learning to read the landscape



Vitruvian Man



Lorenz Attractor



Fractals

Limited by self-central design traditions

Our immediate survival and comfort is important

Without meaning and interconnection we can oversimplify our environments

Design is a process to have conversations with complexity, to reveal layers of meaning, to take what at first looks like chaos and make it legible



# Increase our Design Literacy

All kinds of wonderful things bounce off one another in our brains and interact with our senses to create meaning

Design Elements as visual fundamentals

Landscape design in three dimensions and across time

Engage all the senses

For Zoom, I'm going to ask you to use your visual imagination

Design Elements include:

Rhythm and Line

Emphasis

Proportion/Scale

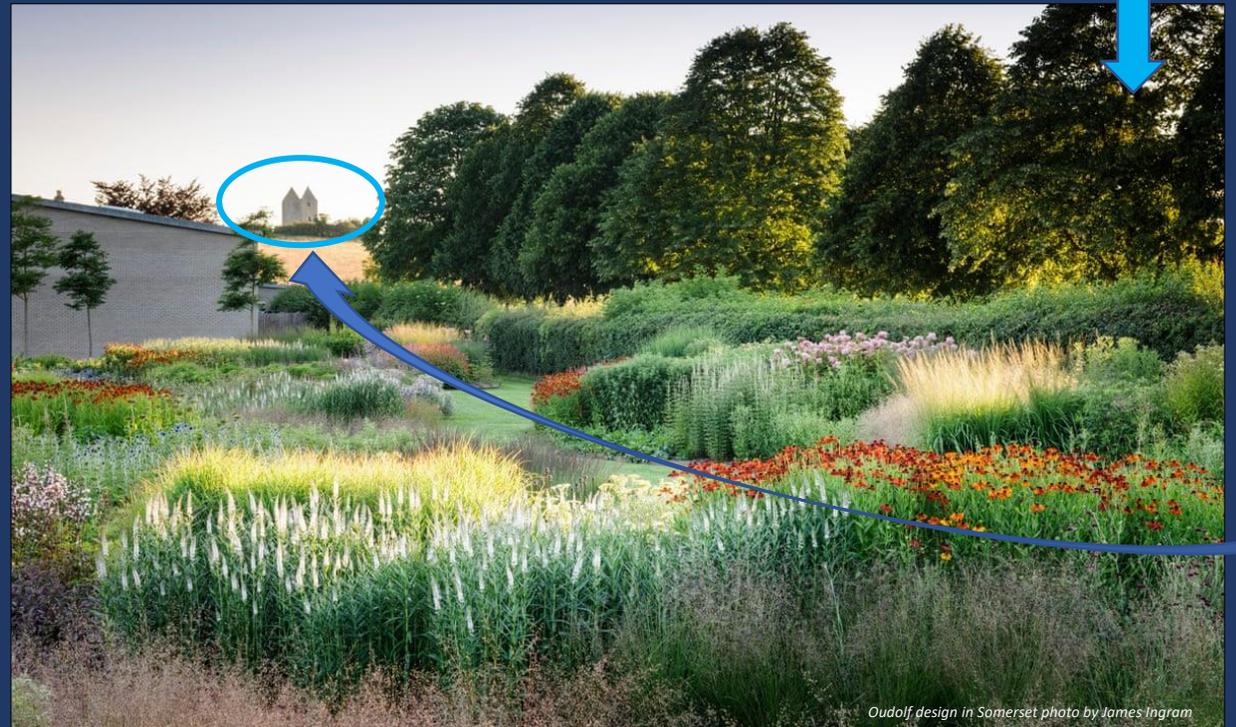


# Increase our Design Literacy

## If you knew more about Rhythm and Line

1. Rhythm and Line create patterns that make the landscape legible
2. Placement is very important to solve functional issues and create comfortable spaces

...what would you change in your yard?



Oudolf design in Somerset photo by James Ingram



# Increase our Design Literacy

If you knew more Emphasis...

1. Our eye is drawn to what is important in the landscape
2. Pattern and Rhythm in more naturalistic plant materials is used in contrast with a strong architectural feature

...what would you change in your yard?



*Sullivan Arch Garden Roy Diblik, photo from Oudolf*



# Increase our Design Literacy

## If you knew more about Proportion and Scale

1. Very tall Chicago skyline steps down to tall dark hedges with a lot of mass, then down to human scale
2. Transitions to raised beds with color and layers of interest through the seasons
3. The more naturalistic material balances the strong forms with a “messy” softness
4. That shrub is carefully placed so it doesn't loom over you if you're standing at the edge of the bed – you can lean in to engage the low vegetation in the spring

...what would you change in your yard?



# How would you read these landscapes?

Rhythm & Line  
Scale/Proportion

Emphasis  
Meaning



# Increase our Design Literacy

We get intimidated by “natural” more biodiverse landscapes because we’ve been taught that they’re “weedy” and “messy” and reflect poorly on us

The image we most often hold in our mind is of an abandoned house

Improve our eco-literacy to understand when we’re looking at more complex ecosystems

Improve our design literacy so we can put things together in more complex patterns that have meaning to us

This is a very individualized landscape, but it looks welcoming, loved, maintained and it’s supporting more biodiversity than a traditional mowed suburban lawn

And they put a sign up just in case we’re still learning our ABC’s



Increase our Design Literacy – start learning to read the landscape

## Start Tomorrow

Head out into your yard

What's most important to you?

Does your yard function well?

Are you connected and interacting with your yard?

What do you think is beautiful?

How do you feel in your backyard?

How important are other people's opinions?

Visit other gardens like Garden In the Woods in Framingham, MA

Find native plants that are creatively incorporated within a larger garden like the Coastal Maine Botanical Gardens in Boothbay, ME



Coastal Maine Botanical Gardens photo by W. Cheeley



# Building Biodiversity



Rhythm and Line  
Emphasis  
Proportion/Scale  
And...

**Research**  
create an Inventory

**Analysis**  
opportunities & issues

**Synthesis**  
generate goals & objectives

**Conceptualization**  
plans, photos, stakes

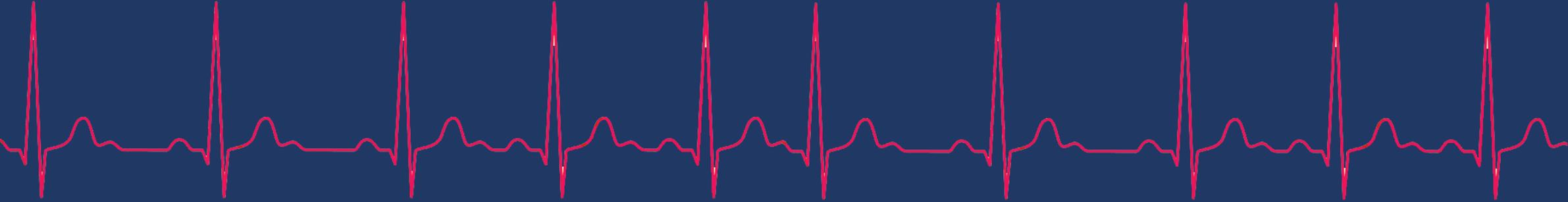
**Development**  
get specific

**Implementation**  
get the shovel

**Evaluation**  
how's it working?



Repeat

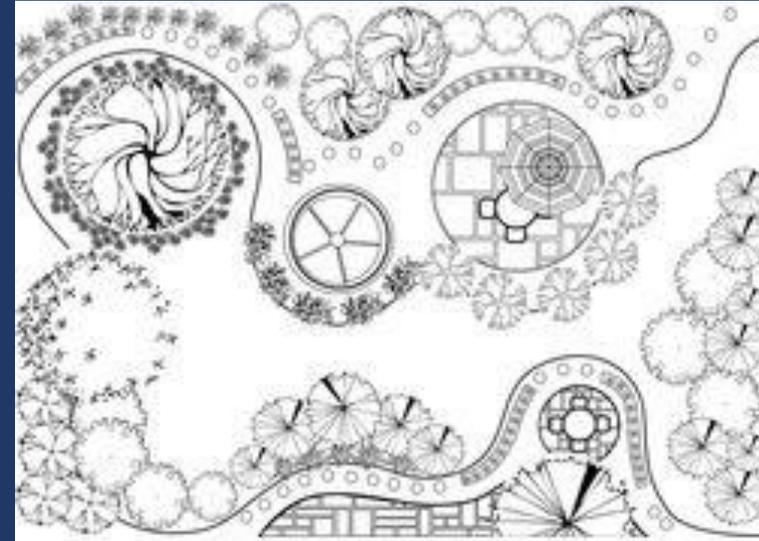


# Building Biodiversity - BTW

## Two Dimensional Design

Good starting point but

Easy to get too focused on the flat picture



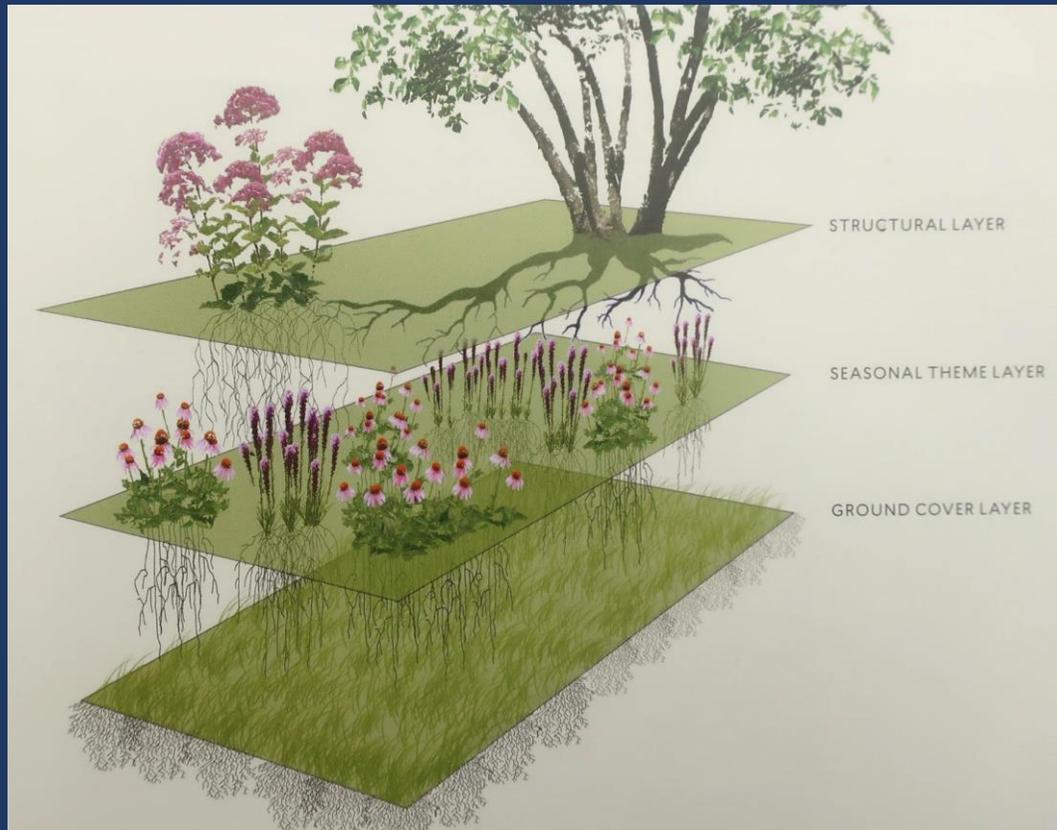
Can result in isolated plantings without functional diversity

Customize your design process IRL in three dimensions, plus  
patience and editing over time



# Building Biodiversity

## Plant Communities within a Design Framework



Layering a landscape vertically within a well defined designed framework

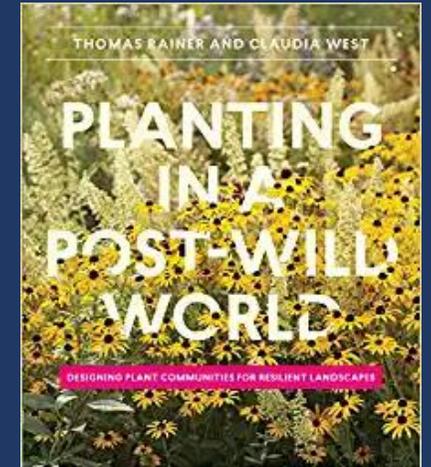
Roots and soil interconnected

Structural Layer includes trees and shrubs and emphasis and scale

Seasonal layers offer year-round interest, rhythm and pattern

Ground cover layers help crowd-out weeds and stabilize soil

Achieve density and diversity in a clearly intentional plan



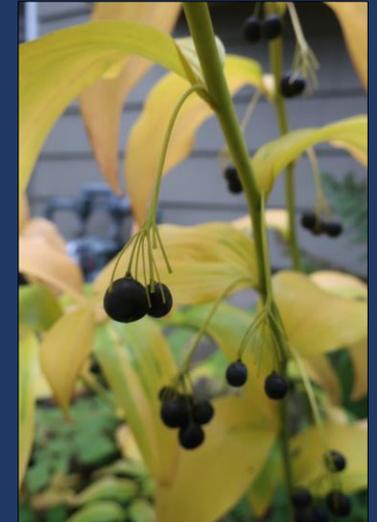
“Our mantra for planting design is to create legibility in the design layers and diversity in the functional layers.”



# Building Biodiversity

## Write What You Know

### Shrubs and Groundcovers



# Building Biodiversity

## Write What You Know

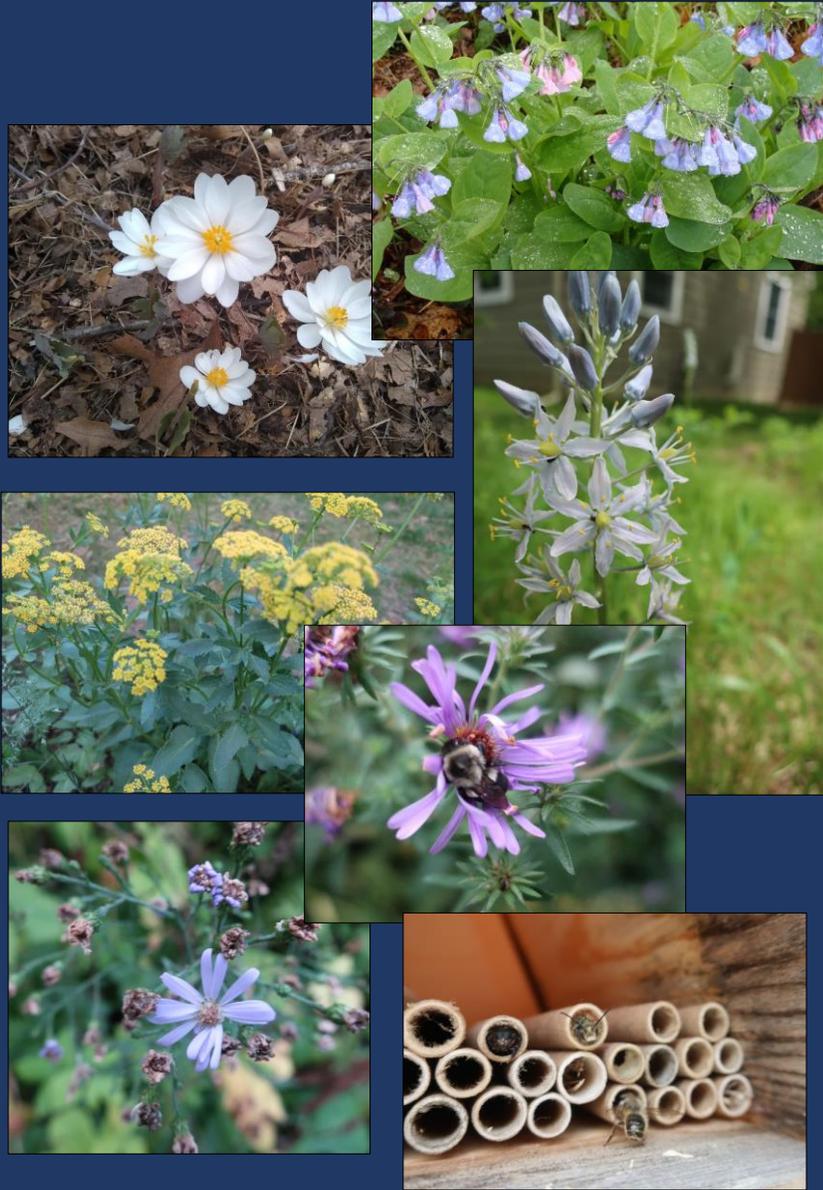
I plant for me, and for the next generation



# Building Biodiversity

## Write What You Know

Flowers spring through fall  
Lots of different shapes



Ecologically, bees can be separated into two groups based on the relative length of mouthpart segments within their tongues, called proboscides. The long and short tongues are used to gather nectar.

Some long-tongued bees like Apidae and Megachilidae, favor deep flowers with a



A long-tongued bee (Anthophora centriformis) drinking nectar from a beardstongue flower (Penstemon parryi).



A short-tongued bee in the genus Colletes taking nectar from the shallow florets of a sunflower (Helianthus annuus)

Bee Basics



# Building Biodiversity

## Write What You Know

Majority native to North America and New England

Plant in layers and leave bare soil, use bold colors for emphasis

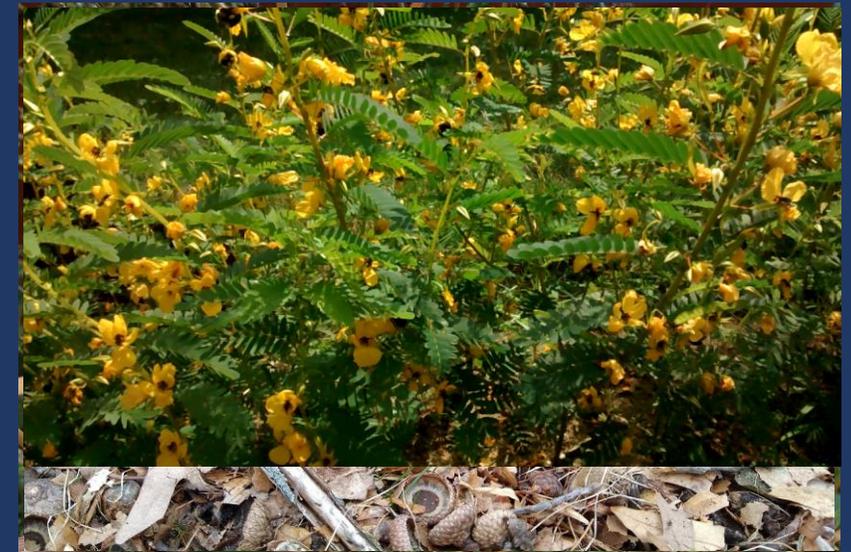
Reduce lawn so just enough balance with plants and room for a table and chairs

Vegetation up for the winter for insects and birds

Leaf litter for the soil, some stems and branches, and no bark mulch

Some non-natives and an herb garden that attracts pollinators

No pesticides or herbicides



# Grow Your Own

## Starting from Seed

Purchase from a reputable seed company that lists genus and species of each plant

Collect responsibly in your community

Never collect rare or endangered species

Ask permission

Leave seed behind to continue population

Harvest from your backyard



Asters



Cardinal Flower



Goldenrods



Milkweeds



Penstemons



# Grow Your Own

## Cardinal Flower *Lobelia cardinalis*

Seeds/Packet	750
Seeds/Ounce	400,000
Germination Code	C(60) D
Life Cycle	Seeds germinate after a period of <u>cold, moist stratification</u> . (A common method of breaking dormancy naturally for species requiring cold moist stratification is to sow seeds outdoors fall-winter.)
Sun Expc	
Soil Mois	
Height	<u>Artificial Stratification</u> : Mix seeds with equal amounts or more of damp sand, vermiculite, or other sterile media (moist, but not so wet that water will squeeze out of a handful). We use fine sand for small quantities. For large quantities, we use medium grade vermiculite. Place mixture in a labeled, sealed plastic bag and store in a refrigerator (33-38°F). Stratify for the # days indicated in parentheses. If two months (C(60)) of this cold storage before planting is normally required to break the dormancy of these seeds, one month may work for many species if time is a constraint. Some seeds may sprout in the storage bag if moist stratified too long. If sprouting occurs, plant immediately.
Bloom Ti	
Bloom C	
Advantag	
USDA Zo	
Plant Spa	
Catalog N	



Collect Seed

Purchase landscape plug trays

Purchase soil



# Grow Your Own



Add soil to trays



Water thoroughly

Sprinkle seed

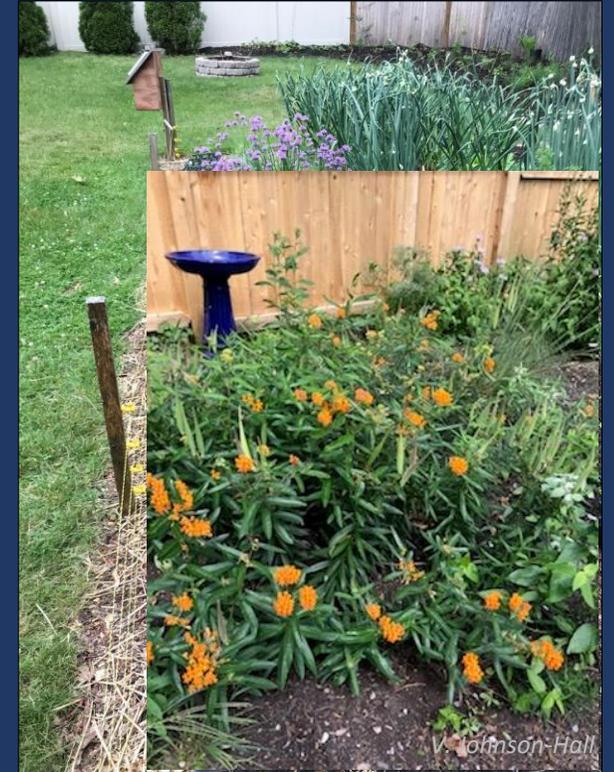
# Grow Your Own



Label and make notes  
Water gently  
¼" Screen over tray to protect from rodents



Need cold, need light  
Protected location  
Sun in spring  
Monitor for water until germinate



# Grow Your Own

## Seedlings

Divide so that you have only one plant per tray cell

Keep them watered and Lobelia in full sun

Plant in the fall when the roots are the depth of the tray cell

Take lots of baby pictures!

You can also contact local native plant nurseries like Nasami and Oakhaven Sanctuary for landscape plugs



April



June



Autumn



# Hall of Shame

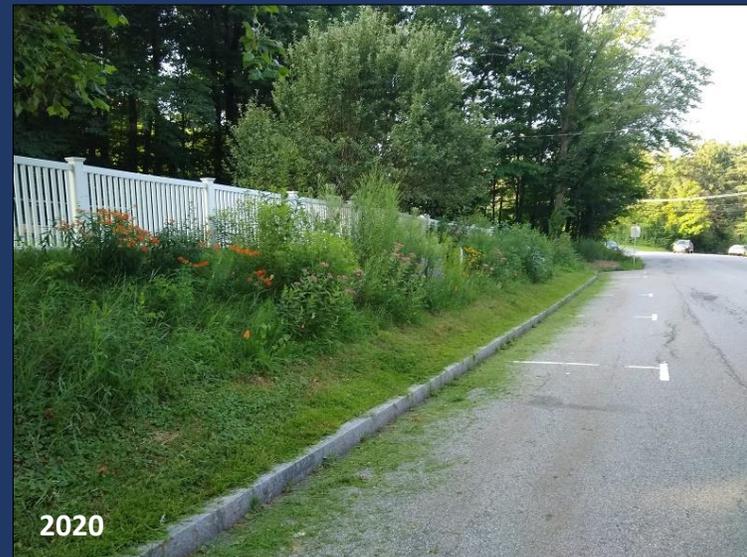
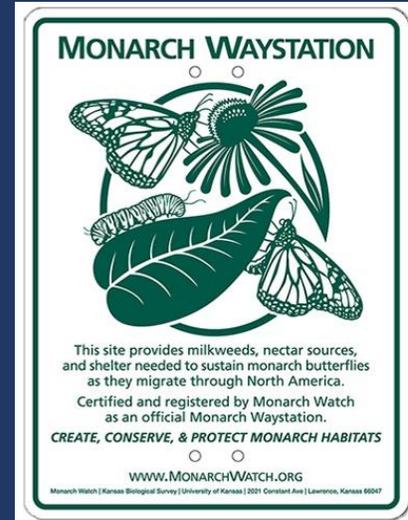
I just can't even...

Get involved in the Backyard Beyond



# Building Biodiversity

## The Backyard Beyond Volunteering



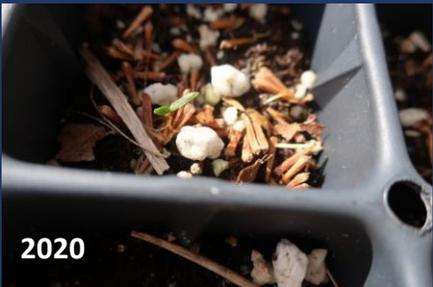
# Building Biodiversity

## The Backyard Beyond - Volunteering



# Building Biodiversity

## The Backyard Beyond Volunteering



# Common barriers to building backyard biodiversity

*People will judge me because my yard looks different than what they're used to*

Times are changing and you've got back-up –good design includes biodiversity

*Bigger is better*

We know that's not true for many plant materials

*I'm overwhelmed, I don't have time*

Work in phases - do something small every season

*It has to look perfect*

There is no such thing, and the critters don't see it the way you do

*I don't know enough*

Apply what you do know and keep learning

*I don't have the budget*

Responsibly collected seeds are free, buy smaller materials, group share!

*I'll fail*

Yep, and when you persist you'll succeed too

*Be Confident and Inspired!*



W. Cheeley

American Lady caterpillar feeding on backyard *Antennaria* sp.



Thank you! Questions?