

The Future of Landscapes: great plants and forward thinking for resilient and beautiful gardens.



Horticulturist
Plant Physiologist
Garden Ecologist
Consultant and Contractor





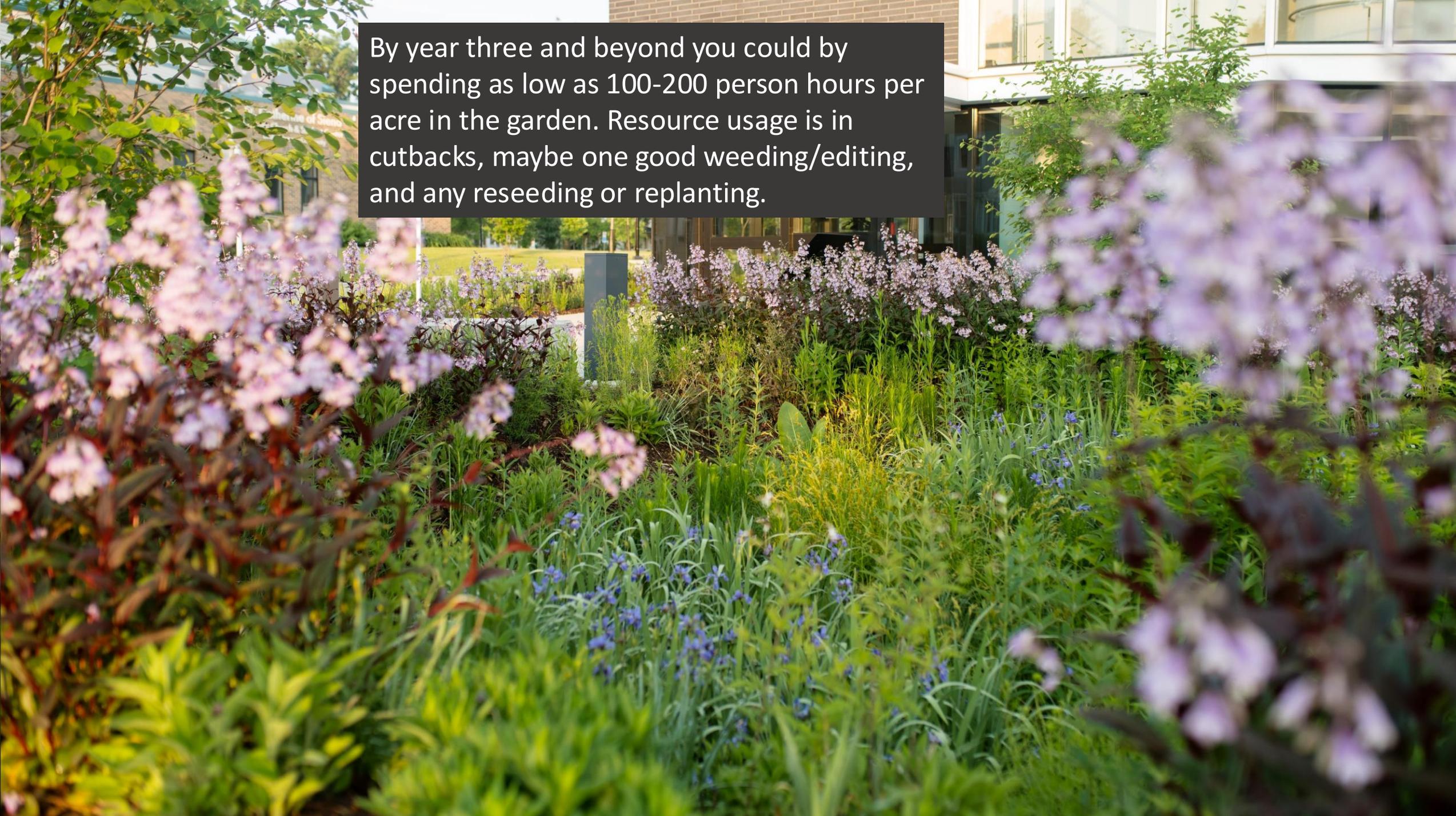
IOWA
ARBORETUM
& Gardens



Compared to traditional garden management, naturalistic gardens:

- Decreases in management and resource cost over time
- Year one still has a high cost of plant material, labor, and time
- Significant knowledge and skill in plant identification needed
- Significant knowledge of plant physiology/behavior needed
- Usual behaviors of weeding, watering, nutrient management, etc. will have to be unlearned or changed

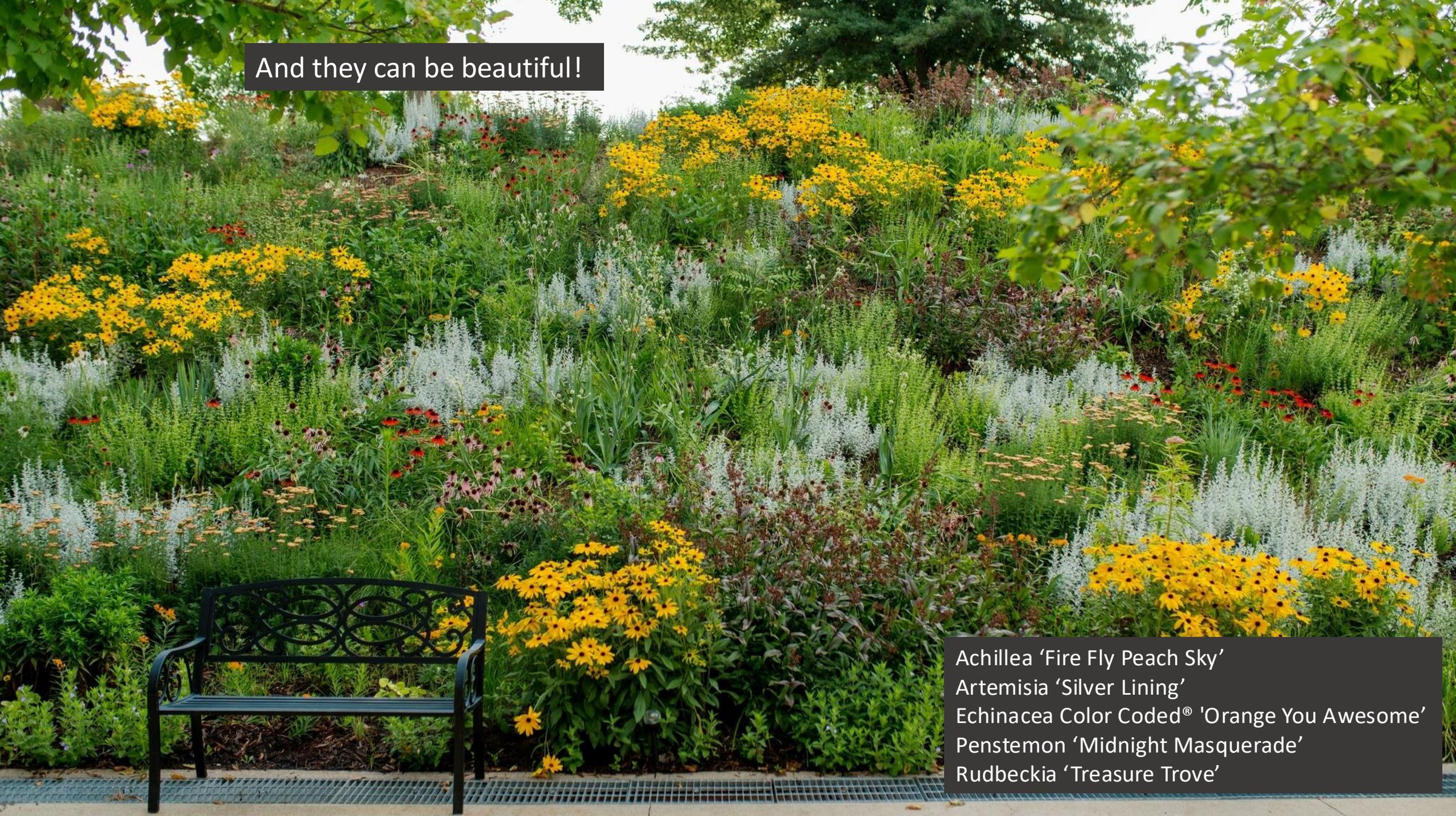
By year three and beyond you could by spending as low as 100-200 person hours per acre in the garden. Resource usage is in cutbacks, maybe one good weeding/editing, and any reseeding or replanting.



Depending on your aesthetic goals, some projects can be even as low as 50 hours per acre annually. Especially long-term, there are significant resource savings compared to traditional garden types (750+ hours per acre per year).



And they can be beautiful!



Achillea 'Fire Fly Peach Sky'
Artemisia 'Silver Lining'
Echinacea Color Coded® 'Orange You Awesome'
Penstemon 'Midnight Masquerade'
Rudbeckia 'Treasure Trove'



Managing naturalistic landscapes at any scale:

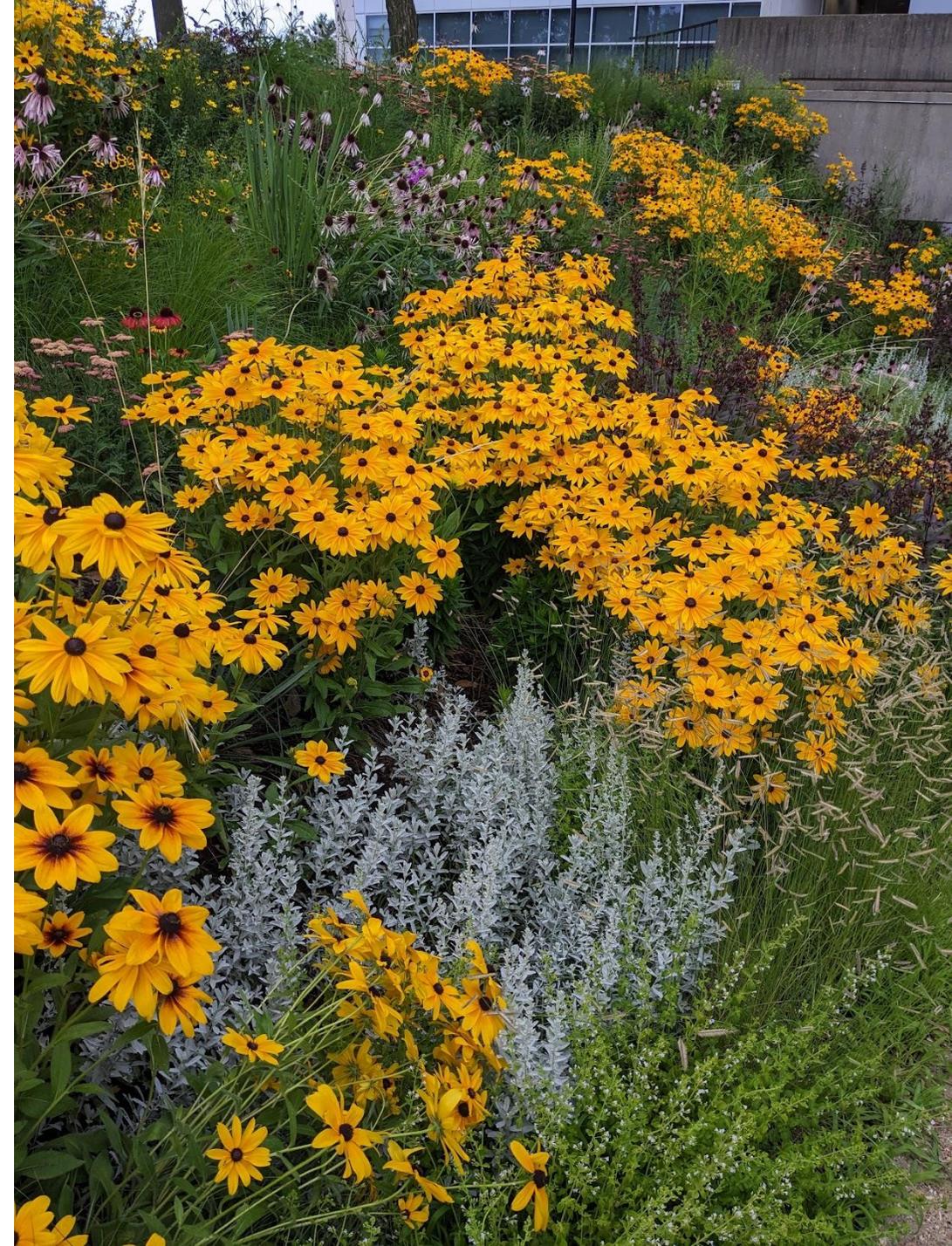
- Thorough site evaluation
- Set goals, identify specific challenges, then actionable management steps
- Realize there is only so much you can influence without starting the landscape over from scratch



Think of these gardens like an ecologist would

Consider the history of the site, and it's future:

- Historical land use
- Soil Type
- Imported soil, scraped top-soil
- How water moves
- Climate patterns
- Microclimates
- Frequent disturbance from people/animals



Goal types

- Aesthetic
 - More flower power
 - Longer phenology
 - Structural/compositional editing
- Management
 - Cut down on time spent weeding
 - Decrease challenges with wildlife
 - Prevent aggressive plants from taking over
- Practical
 - Prevent negative interactions with people
 - Decrease time in treacherous/dangerous to manage areas
 - Improve accessibility



Site Evaluation: consider more than just what is existing now!



**Historical Land Use
1930's**



**Historical Land Use
1960's**



**Historical Land Use
1970's**



Search

Map Unit Legend

Boone County, Iowa (IA015)

Boone County, Iowa (IA015)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
355	Luther loam, 0 to 2 percent slopes	19.5	53.7%
356G	Hayden-Storden loams, 25 to 50 percent slopes	2.3	6.3%
L107	Webster clay loam, Bemis moraine, 0 to 2 percent slopes	0.6	1.8%
L168B	Hayden loam, Bemis moraine, 2 to 6 percent slopes	3.4	9.2%
L307	Dundas silt loam, Bemis moraine, 0 to 2 percent slopes	10.5	29.0%
Totals for Area of Interest		36.3	100.0%

Soil type(s)

Soil Map

Legend Scale (not to scale) v



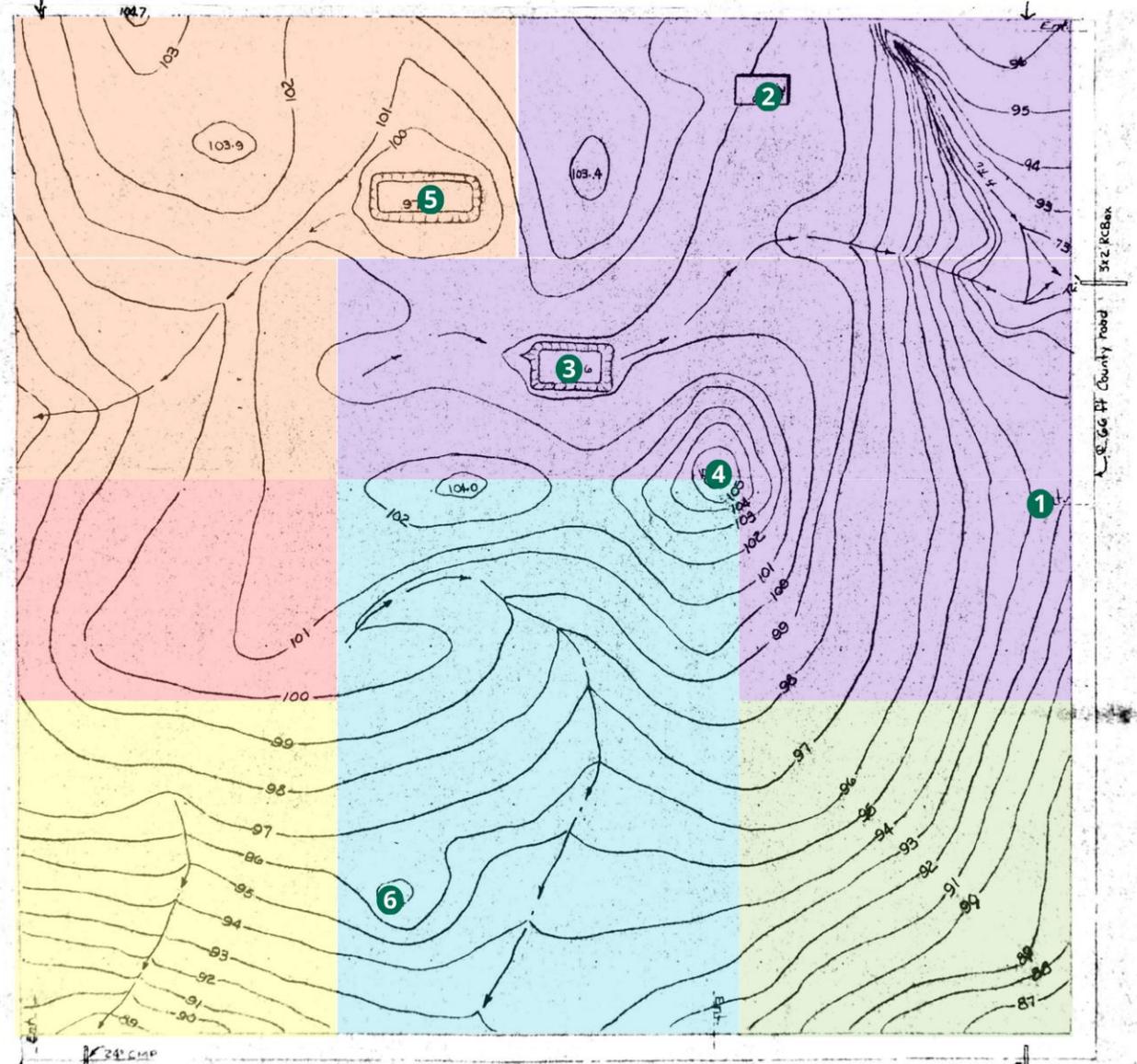
West 40 Acres Drainage Zones & Topography

1. Main Entrance
2. Cafferty Building
3. Pond & Butterfly Garden
4. Jones Memorial Gazebo
5. Palustrine Wetland
6. Arie Kroeze Memorial Tea House

- Drainage Zone 1
- Drainage Zone 2
- Drainage Zone 3
- Drainage Zone 4
- Drainage Zone 5
- Drainage Zone 6

How does water move?

IOWA ARBORETUM INC.
 SW-SE SEC. 3 T82N R26W
 Scale 1" = 100' Feb 1981



24' CMP
 1/4 Cor. Sect. 3-82-26
 Conc. Man. Bound.
 B.M. Spike in Elect. Pole 320 ft West N.E. Corner
 Elev. 100.00
 24' CMP

What will climate feel like in 60 years?

Des Moines, Iowa

Settings

Learn more

Give now!

Des Moines, IA, United States

Selected City

Des Moines, IA,
United States

For high emissions, summers in Des Moines, Iowa are expected to be 12.1°F (6.7°C) warmer and 9.1% drier. Winters are expected to be 10.9°F (6°C) warmer and 23.3% wetter.

Vegetation type:
**Temperate Grasslands,
Savannas and Shrublands**

Best Climate Analog

Kingfisher, Oklahoma,
United States

Climate conditions most similar to Des Moines, Iowa's climate in 2080 can be found today in Kingfisher, Oklahoma, United States.

Vegetation type:
**Temperate Grasslands,
Savannas and Shrublands**

Climate similarity map

The climate similarity map shows how similar today's climates are to 2080's climate in Des Moines, Iowa assuming high emissions. The line indicates the location with highest similarity.

Climate similarity

High

Low



What will climate feel like in 60 years?

St. Louis, Missouri

- Settings
- Learn more
- Give now!

St. Louis, MO, United States

Selected City

St. Louis, MO, United States

For high emissions, summers in St. Louis, Missouri are expected to be 11.3°F (6.3°C) warmer and 6.4% drier. Winters are expected to be 9.7°F (5.4°C) warmer and 17% wetter.

Vegetation type:
Temperate Broadleaf and Mixed Forests

Best Climate Analog

Ferris, Texas, United States

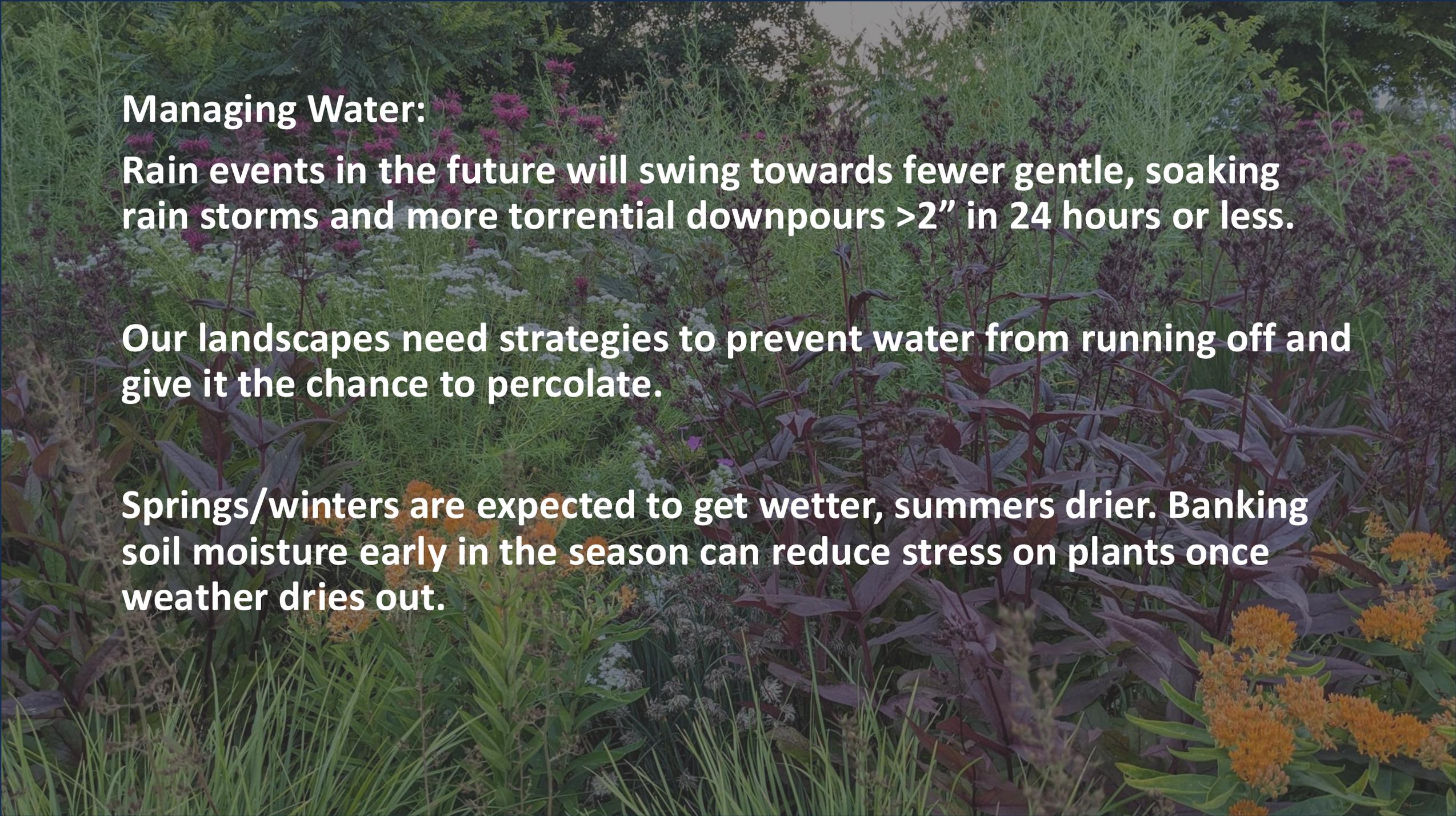
Climate conditions most similar to St. Louis, Missouri's climate in 2080 can be found today in Ferris, Texas, United States.

Vegetation type:
Temperate Grasslands, Savannas and Shrublands

Climate similarity map

The climate similarity map shows how similar today's climates are to 2080's climate in St. Louis, Missouri assuming high emissions. The line indicates the location with highest similarity.





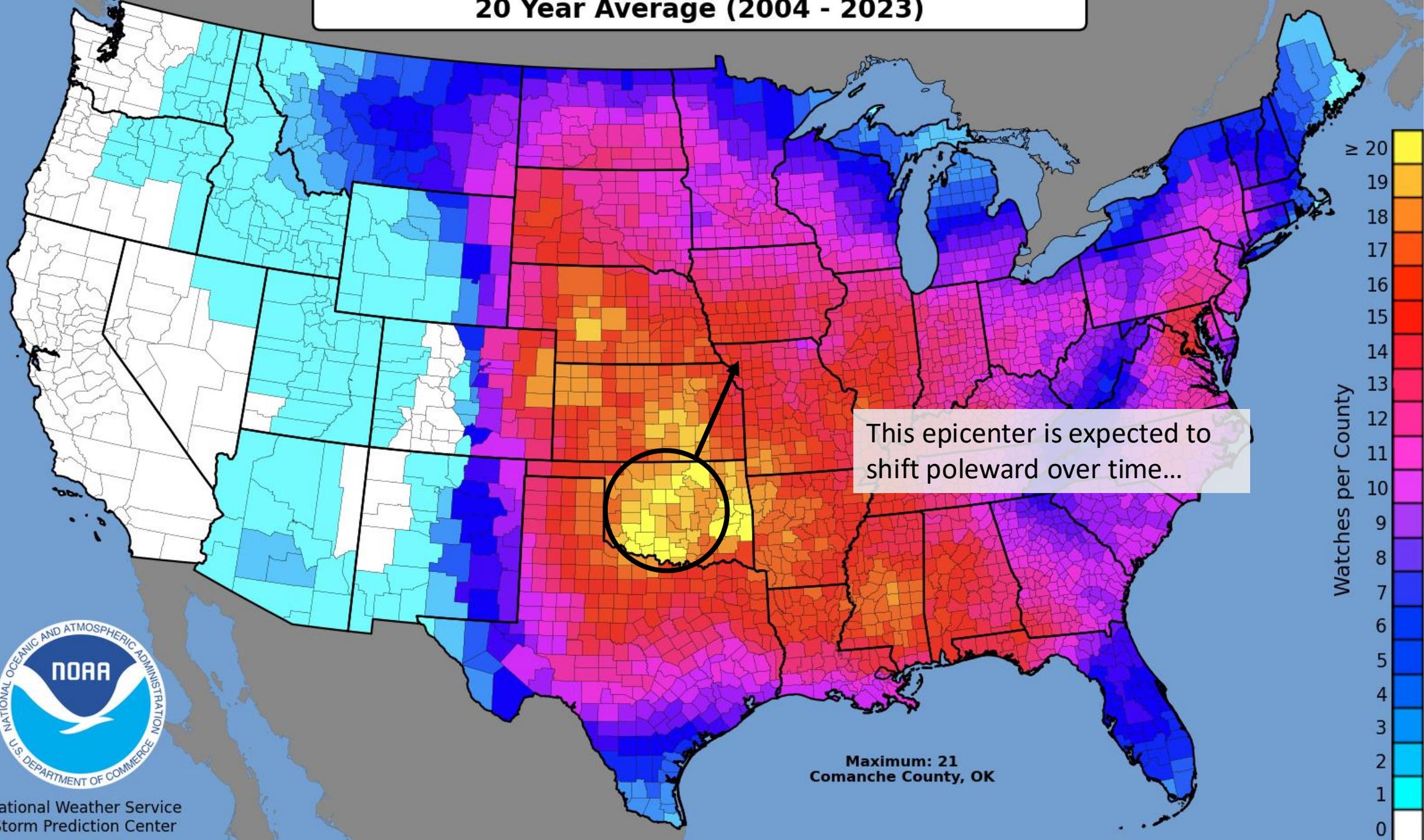
Managing Water:

Rain events in the future will swing towards fewer gentle, soaking rain storms and more torrential downpours >2" in 24 hours or less.

Our landscapes need strategies to prevent water from running off and give it the chance to percolate.

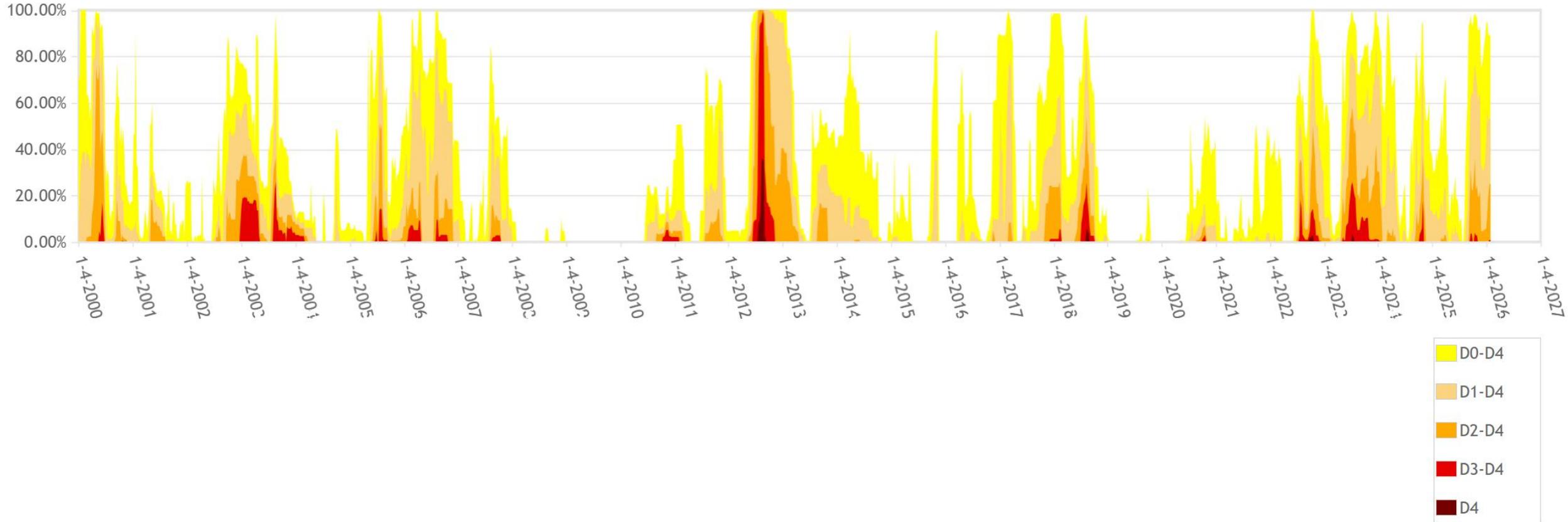
Springs/winters are expected to get wetter, summers drier. Banking soil moisture early in the season can reduce stress on plants once weather dries out.

Annual Average Severe Weather Watches per Year 20 Year Average (2004 - 2023)



National Weather Service
Storm Prediction Center

Missouri Percent Area in U.S. Drought Monitor Categories



General Management



Amsonia 'String Theory'
Artemisia 'Silver Lining'
Echinacea Color Coded® Knock 'em Red
Penstemon 'Midnight Masquerade'
Rudbeckia 'Treasure Trove'

Planting:

- Plugs (50 cell/32 cell) for fast growing or large quantities
- Quarts for things needing help establishing
- #1/Gallon for slow growing herbaceous
- Seed in native annuals or easy to establish perennials
- Trees/shrubs depend on client desires and environmental pressures





Plant Selection:
-Survive now and years into the challenging future
-Provide nectar, pollen, forage, host plant, etc.
-Shelter/habitat contribute to overall ecological productivity

Urban challenges:

- Irreversible soil disturbance (compaction, backfill, tillage, fertilizer, pollution)
- Elevated CO₂ concentration
- Microclimate effect (heat, moisture, wind)
- Urban heat island effect
- Changes in precipitation and runoff
- Aesthetic responsibility, especially in areas with hostile ordinances





Native Plants

- Many can survive, may not thrive
- Often fail to reach the aesthetic standard required in urban settings
- Extraordinary measures often required to transform landscape to suitable environment
- Not often readily available to the average home gardener
- Often require extensive background knowledge to care for/manage well

Non-native Plants and Cultivars

- Many thrive in urban conditions
- Selected to be beautiful and low-maintenance in difficult places
- Marginal ecological benefits better than nothing
- Can be the gateway to getting people enthusiastic about native plants
- Readily adapt to the care of the average home gardener or landscape manager

A combination of native plants and thoughtfully selected non-native plants can create abundant, diverse, and beautiful urban habitat.

An aerial, top-down view of a large parking lot. The cars are arranged in neat, parallel rows, filling most of the frame. The colors of the cars vary, including white, black, blue, red, and yellow. The perspective is from directly above, showing the tops of the cars and the yellow lines of the parking spaces. The background is a light-colored asphalt or concrete surface.

My take on native plants: To put it into perspective, let's rate landscapes based off a percentage of ecological function. In this instance 0% is a plant-less parking lot, 100% is an expansive prairie/woodland remnant. The existence of plants in the landscape already increases the percentage of ecological function significantly. It may be to 10% it may be to 70%, but anything is better than zero.

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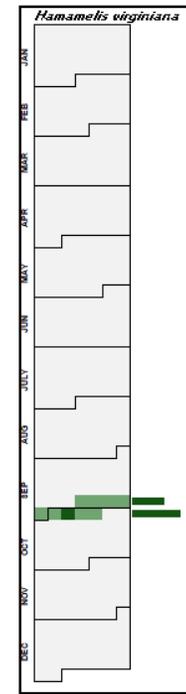
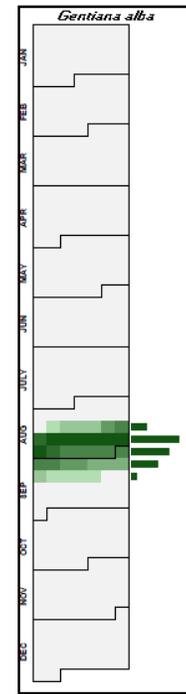
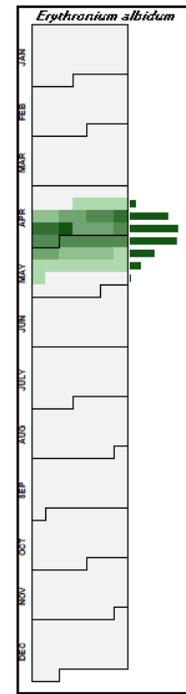
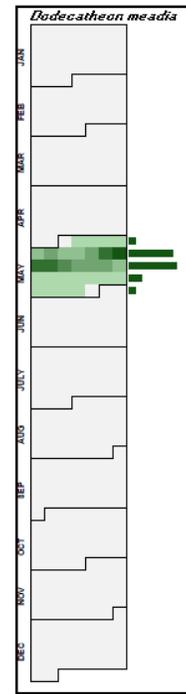
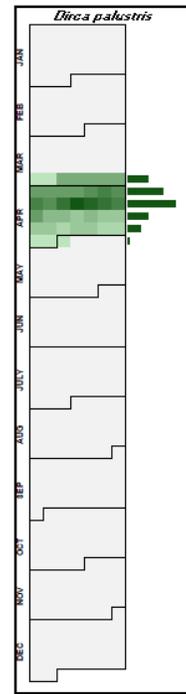
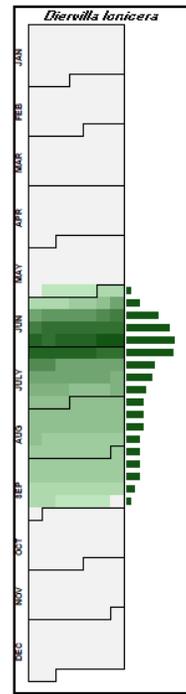
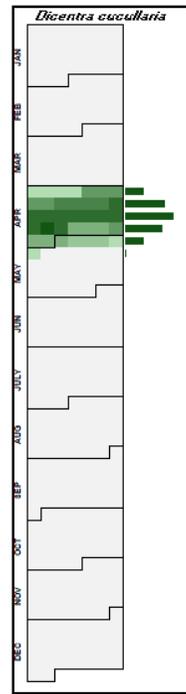
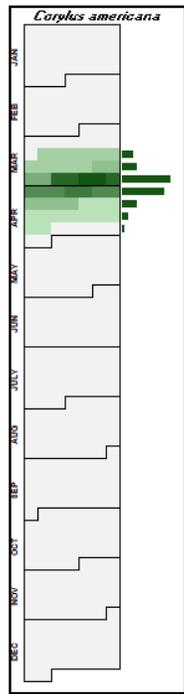
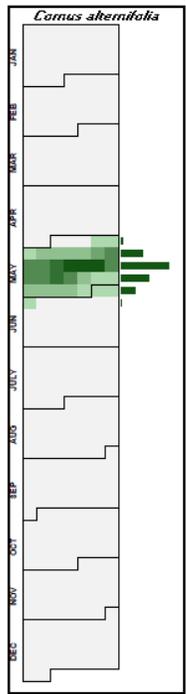
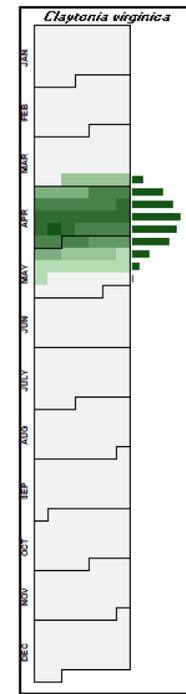
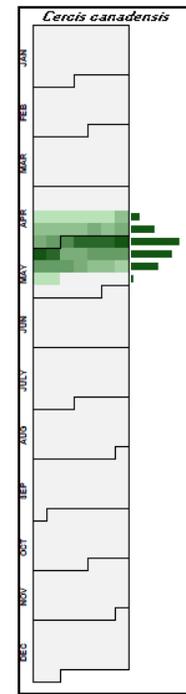
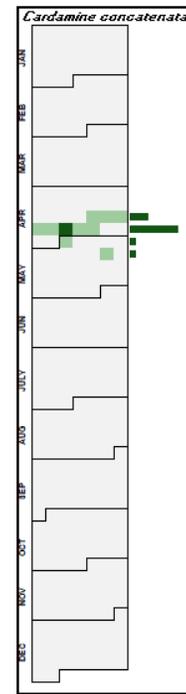
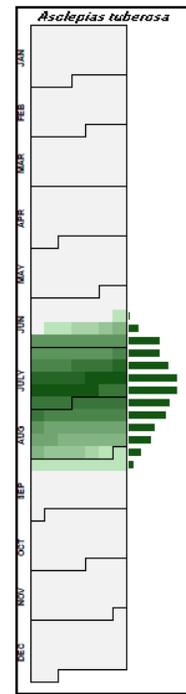
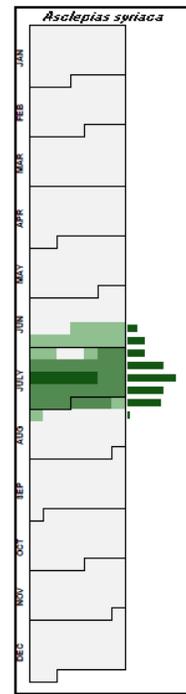
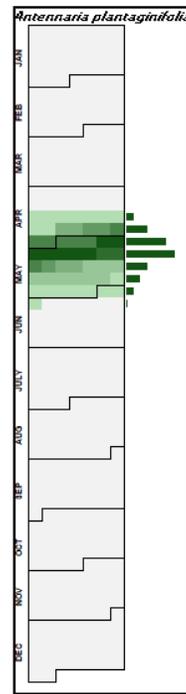
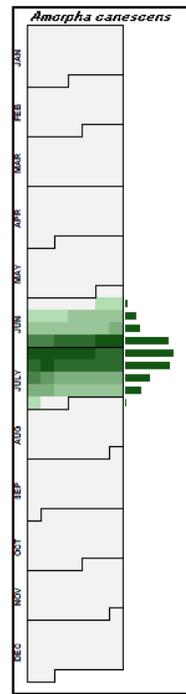
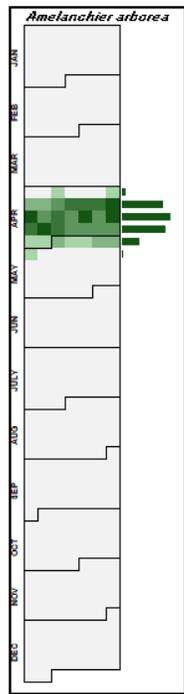
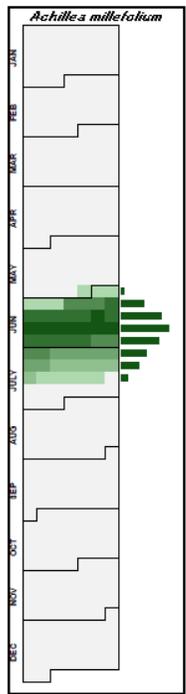
Article | [Open access](#) | [Published: 07 November 2023](#)

Earlier and more uniform spring green-up linked to lower insect richness and biomass in temperate forests

[Lars Uphus](#) , [Johannes Uhler](#), [Cynthia Tobisch](#), [Sandra Rojas-Botero](#), [Marvin Lüpke](#), [Caryl Benjamin](#), [Jana Englmeier](#), [Ute Fricke](#), [Cristina Ganuza](#), [Maria Haensel](#), [Sarah Redlich](#), [Jie Zhang](#), [Jörg Müller](#) & [Annette Menzel](#)

[Communications Biology](#) **6**, Article number: 1052 (2023) | [Cite this article](#)

1113 Accesses | **5** Altmetric | [Metrics](#)



RELATIVE FLORAL ABUNDANCE THROUGH SEASON

Use Cultivars and Non-native plants to fill in gaps in home gardens

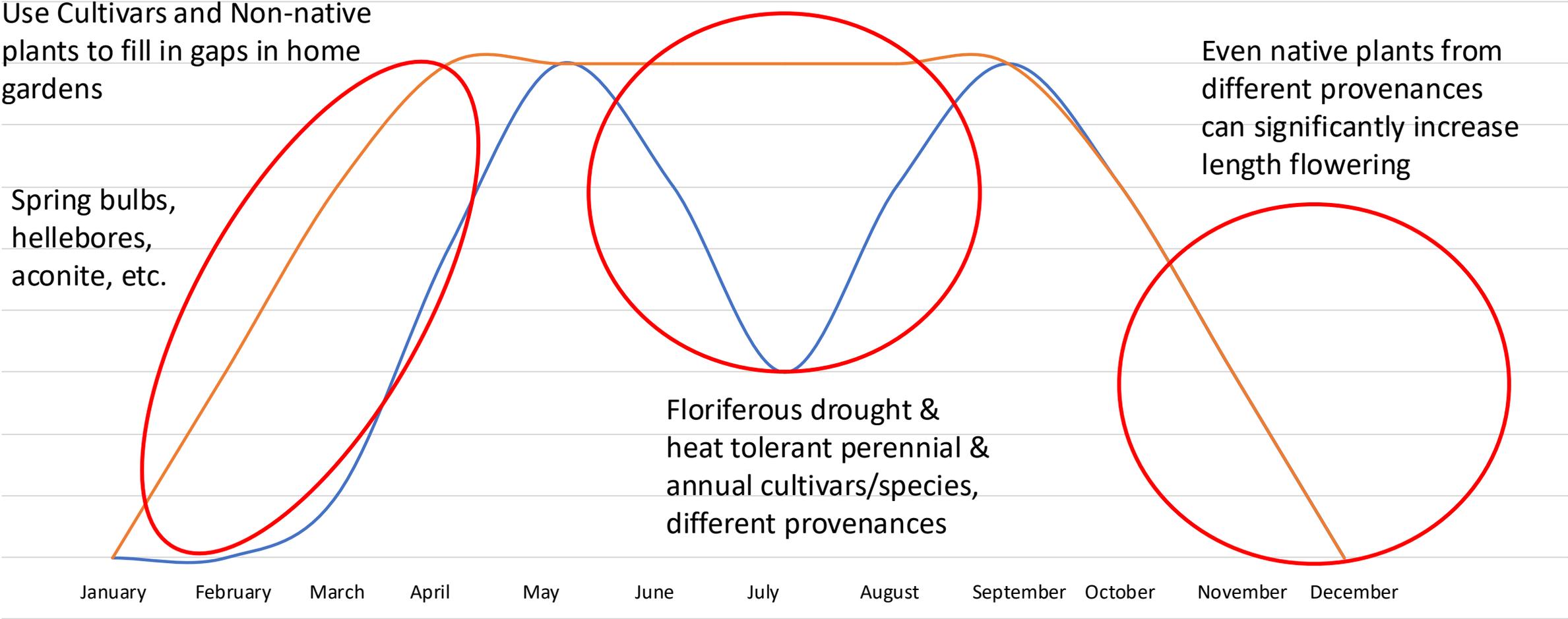
Spring bulbs, hellebores, aconite, etc.

Even native plants from different provenances can significantly increase length flowering

Floriferous drought & heat tolerant perennial & annual cultivars/species, different provenances

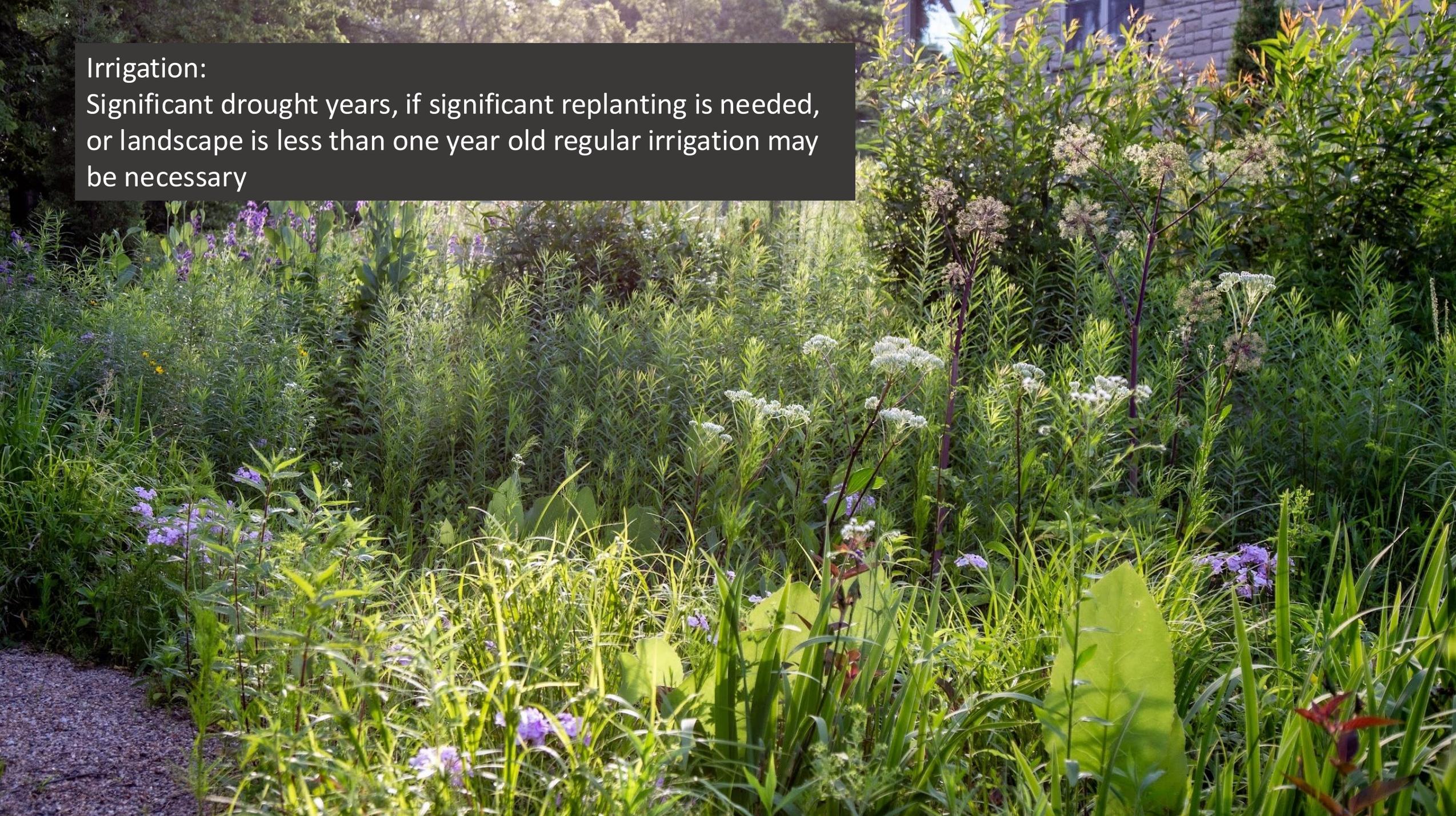
January February March April May June July August September October November December

- Native Plants Alone
- Native Plants w/ Cultivars and Non-native Plants

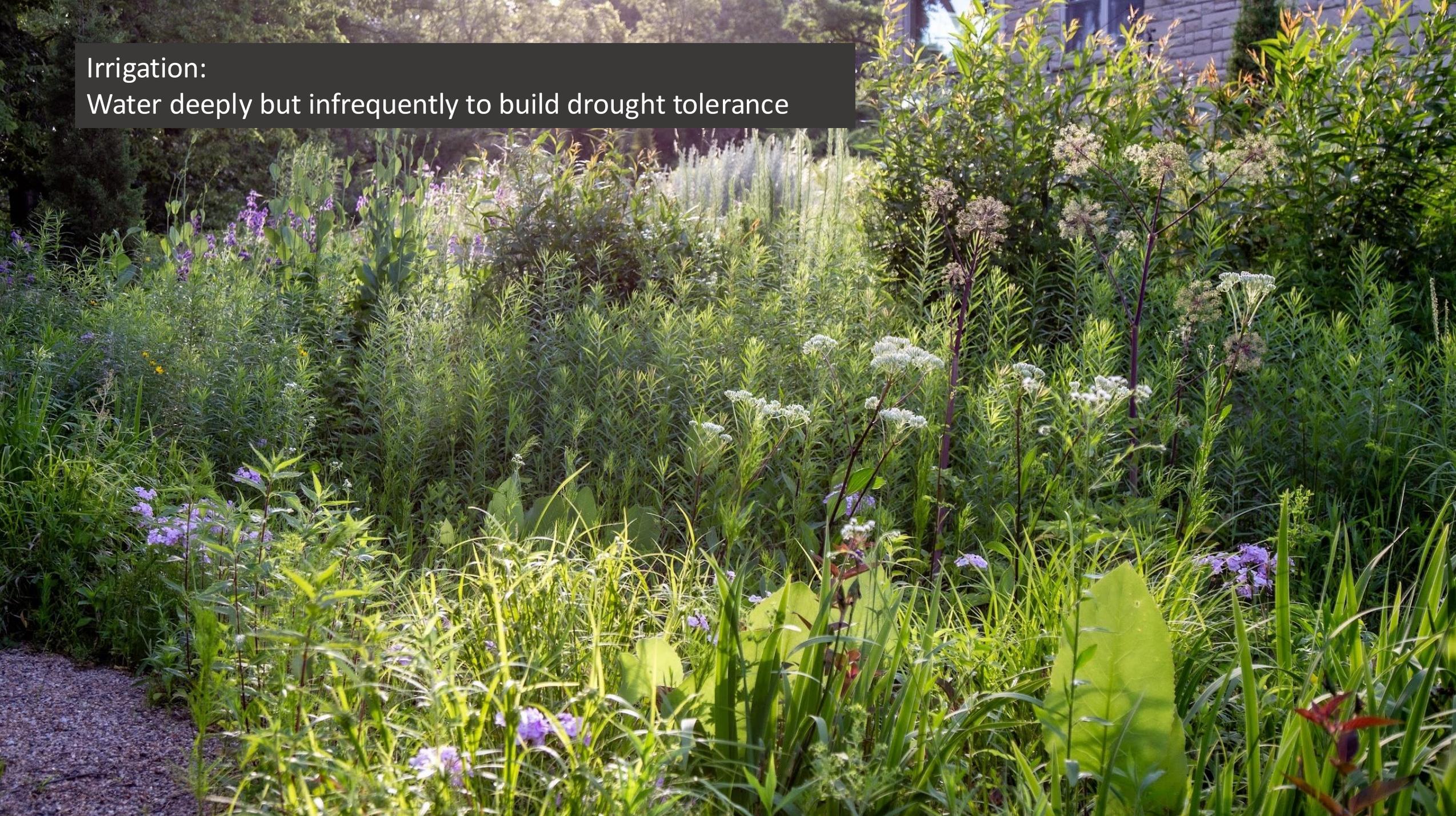


Irrigation:

Significant drought years, if significant replanting is needed, or landscape is less than one year old regular irrigation may be necessary



Irrigation:
Water deeply but infrequently to build drought tolerance



Weeding:

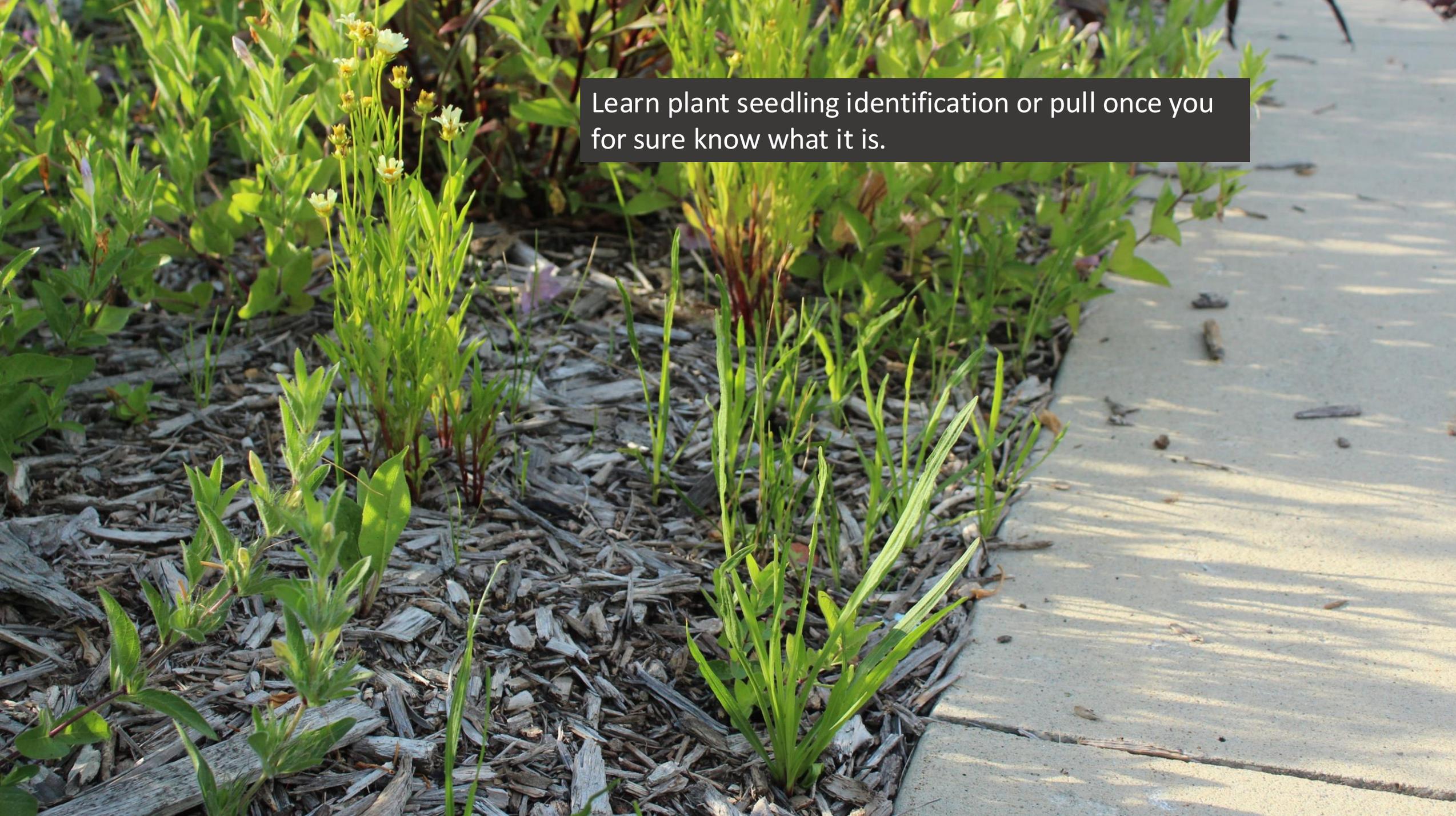
- Chop/stump treat woody weeds if possible
- Pull weeds rather than hoe/dig
- Disturb the soil surface as little as possible
- Don't let weeds complete their lifecycle





Traditional landscapes: pull if it isn't supposed to be there
Naturalistic landscapes: only pull if you can identify

Learn plant seedling identification or pull once you for sure know what it is.

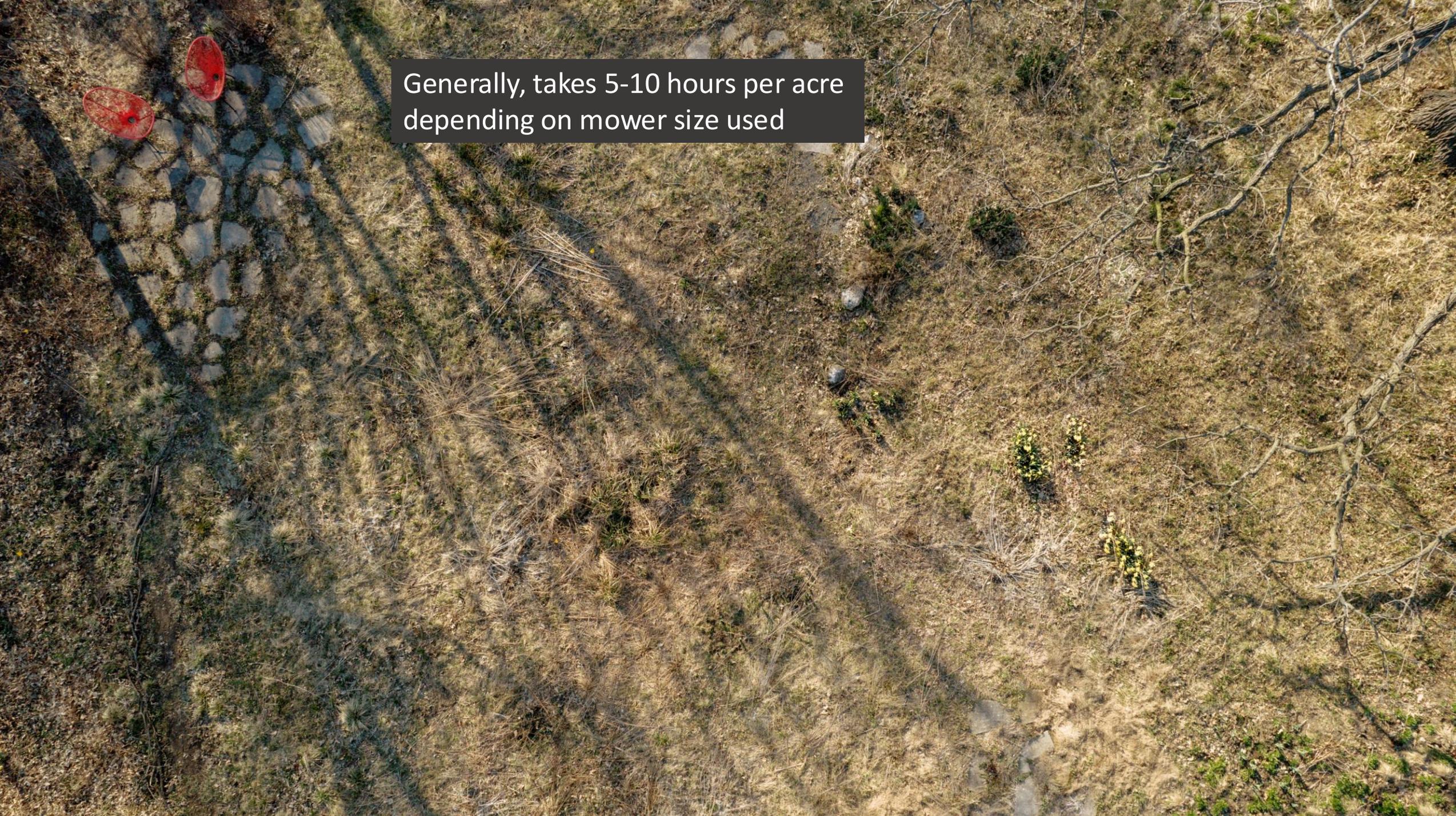


Annual cutbacks

- Mower with mulching abilities
- Mow at a 3-4" mowing height

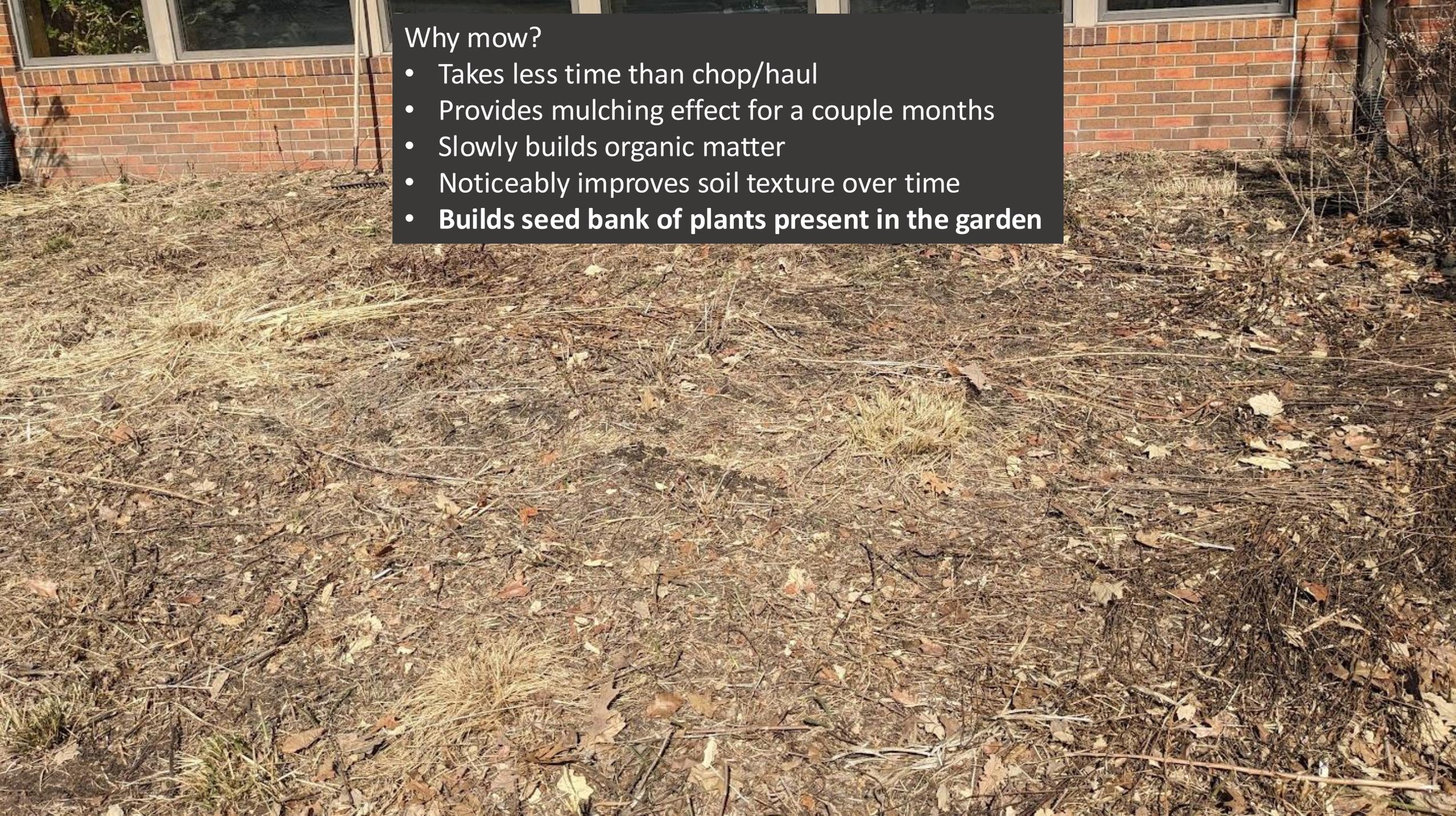


Generally, takes 5-10 hours per acre depending on mower size used



Why mow?

- Takes less time than chop/haul
- Provides mulching effect for a couple months
- Slowly builds organic matter
- Noticeably improves soil texture over time
- **Builds seed bank of plants present in the garden**

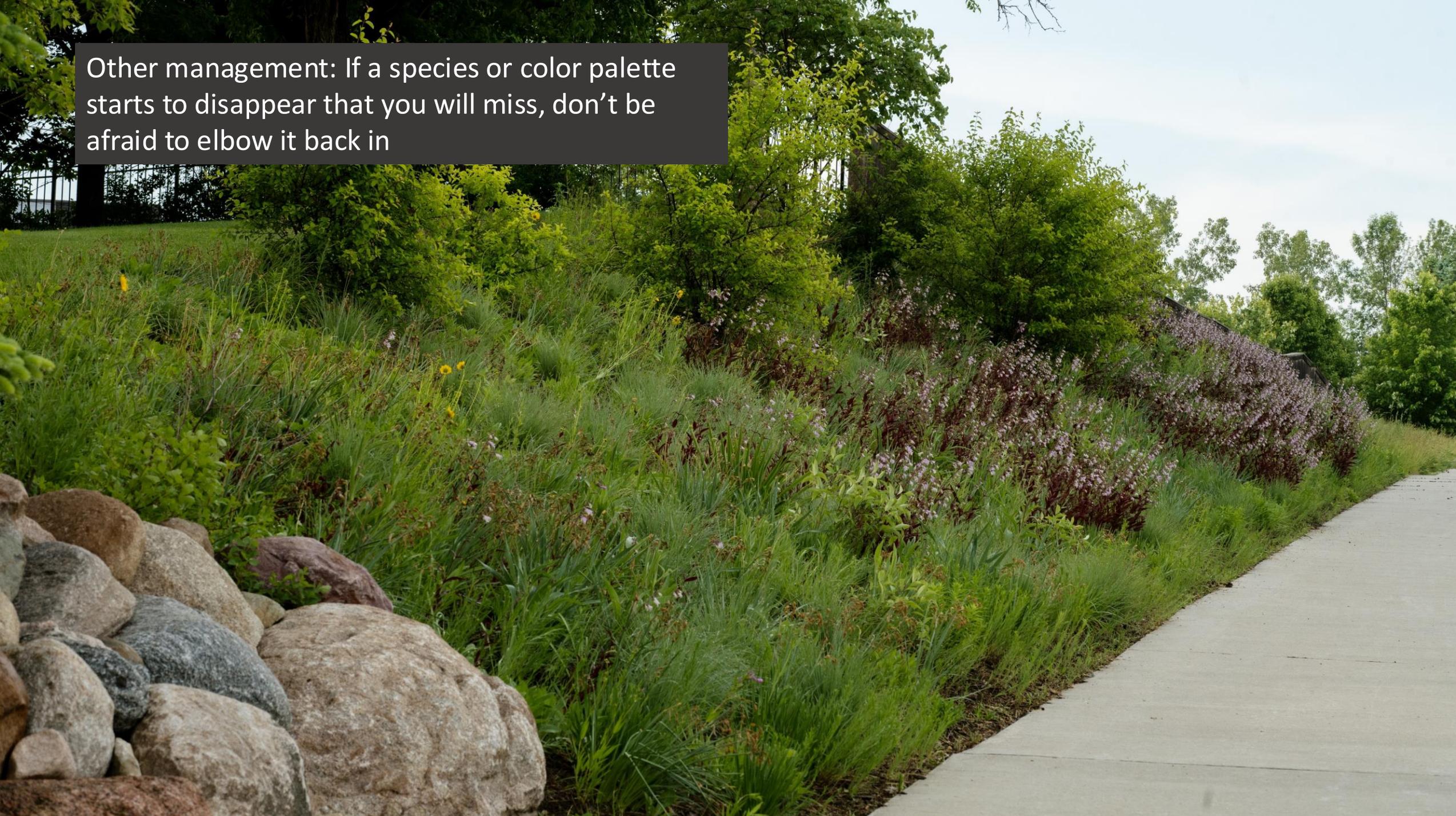




Building a seed bank of plants existing/designed into the site becomes important as short-lived perennials start to die and move around, disturbance gets introduced, etc.

Amsonia 'String Theory'
Artemisia 'Silver Lining'
Penstemon 'Midnight Masquerade'

Other management: If a species or color palette starts to disappear that you will miss, don't be afraid to elbow it back in



Keep the bullies in check



Don't be afraid to use tricks from other fields or out of the box thinking (i.e. prairie management tactics, Chelsea chop, mineral topdressing, 'selective herbivory mimicry')



Realize that it is very difficult to change the overall design of the garden without starting over



If you can, document interventions done and the impact those actions had on the landscape.



Case Studies



Achillea 'Firefly Diamond'
Artemisia 'Silver Lining'
Penstemon 'Midnight Masquerade'
Phlox Luminary® 'Backlight'

Prairie Strip



2010

Legend



2017

Legend



2021

Legend





Landscape goals:

- Increase aesthetic benefit
- Increase phenology and floral abundance
- Decrease negative interactions with people



Increase aesthetic benefit/floral abundance



2014

Testing Disturbance Methods to Aid Interseeding Forbs in a Grass-Dominated Prairie Restoration in Northeast Indiana

Adam Thada

Chemical: Clethodim

Ornamental Label: Grass Out Max

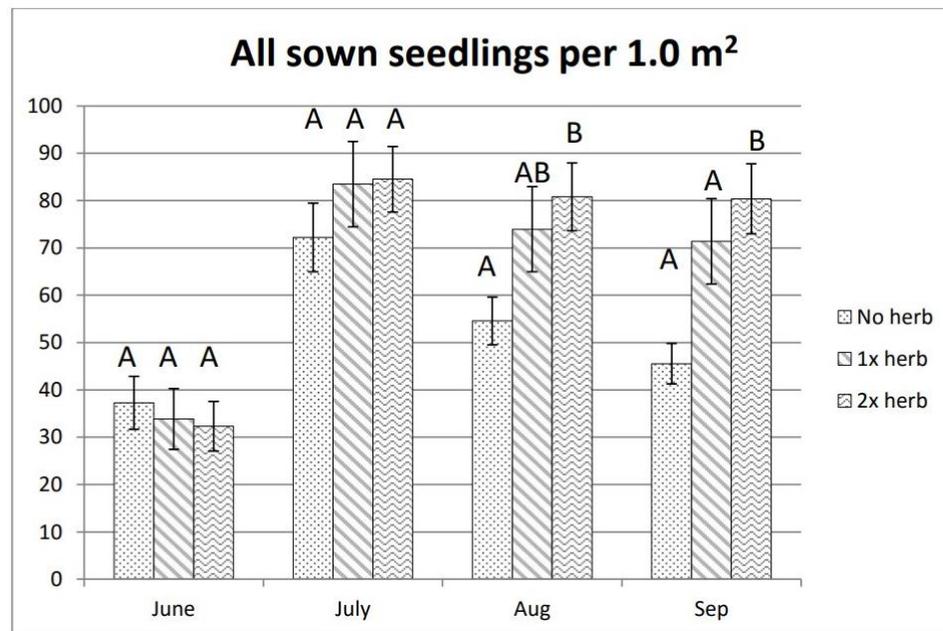


Figure 6: Average seedling counts of all sown species by herbicide treatment, per 1.0 m² plot. Letters mark Tukey's Honestly Significant Difference test results. Within each month, means with the same letters are not significantly different. Error bars are Standard Error.

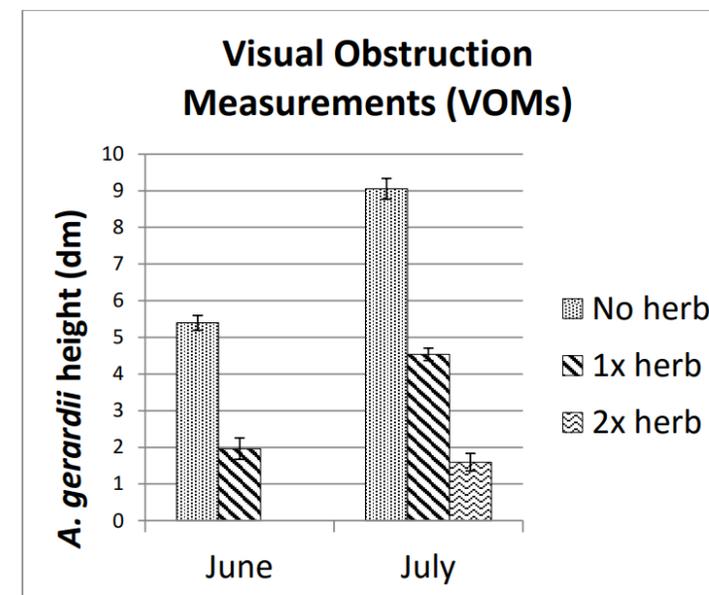


Figure 5: Visual obstruction measurements by month and herbicide treatment. Differences between all treatments were significant at $p < 0.001$. Two outliers were removed from each of the readings. For June, “No herb” plots were $n=19$, and “1x herb” plots were $n=41$. Twenty-one of these 41 plots then received a second round of herbicide (“2x herb”), which again stunted their growth by the following month.







A large, vibrant garden filled with a mix of yellow Black-eyed Susans and purple Asters. The flowers are densely packed and surrounded by tall green grasses. In the background, there are lush green trees and a small white building with a red roof and a cupola. A person is visible in the distance near a wooden structure.

Editing:
Overseed or plant for additional
color/seasonal interest

Borrowing tricks from prairie managers :

- Clethodim applications
- Burn/mow in fall instead of spring to give competitive edge to flowering forbs
- Seed over top or direct plant so that spaces left by grasses are not infiltrated by weeds or more grass



Decrease negative interactions with people



Showy tick trefoil (*Desmodium canadense*)



Manage problem species, occupy niche with more desirable species (i.e. false indigo, partridge pea)



Reevaluate annually





Dry Creek Bed



2010

Legend



2017

Legend



2021

Legend















Landscape goals:

- Cut down on weeding pressure
- Increase aesthetic benefit to first impression area



Cut down on weeding pressure:









Focus future plant selection
on tough plants that readily
set seed, creeping
groundcovers, and plant that
can tolerate existing
conditions.
8-12 inch spacing



Use plants that mimic existing
weed niches: creeping
rhizomes, seedy in
disturbance, annuals





Achillea 'Firefly Diamond'
Penstemon 'Midnight Masquerade'

Increase aesthetic benefit











ARBORETUM
Join as a Member Today!

- Free Admission
- Discount at the Gift Shop
- Priority on Gallery
- Quarterly Newsletter
- Receive Benefits at other Gardens

Achillea 'Firefly Diamond'
Artemisia 'Silver Lining'
Baptisia Decadence® 'Dark Chocolate'
Rudbeckia 'Treasure Trove'
Penstemon 'Midnight Masquerade'



THE ARBORETUM
at Carolina
Dry Creek Bed

Achillea 'Firefly Diamond'
Liatris 'Kobold'
Rudbeckia 'Treasure Trove'
Penstemon 'Midnight Masquerade'



Achillea 'Firefly Diamond'
Penstemon 'Midnight Masquerade'



Achillea 'Firefly Diamond'
Liatris 'Kobold'
Monarda Upscale® 'Red Velvet'
Penstemon 'Midnight Masquerade'



Reevaluate every 2-3 years



**This goal setting
process can be
applied anywhere!**

Weeding method and knowledge impacts management!

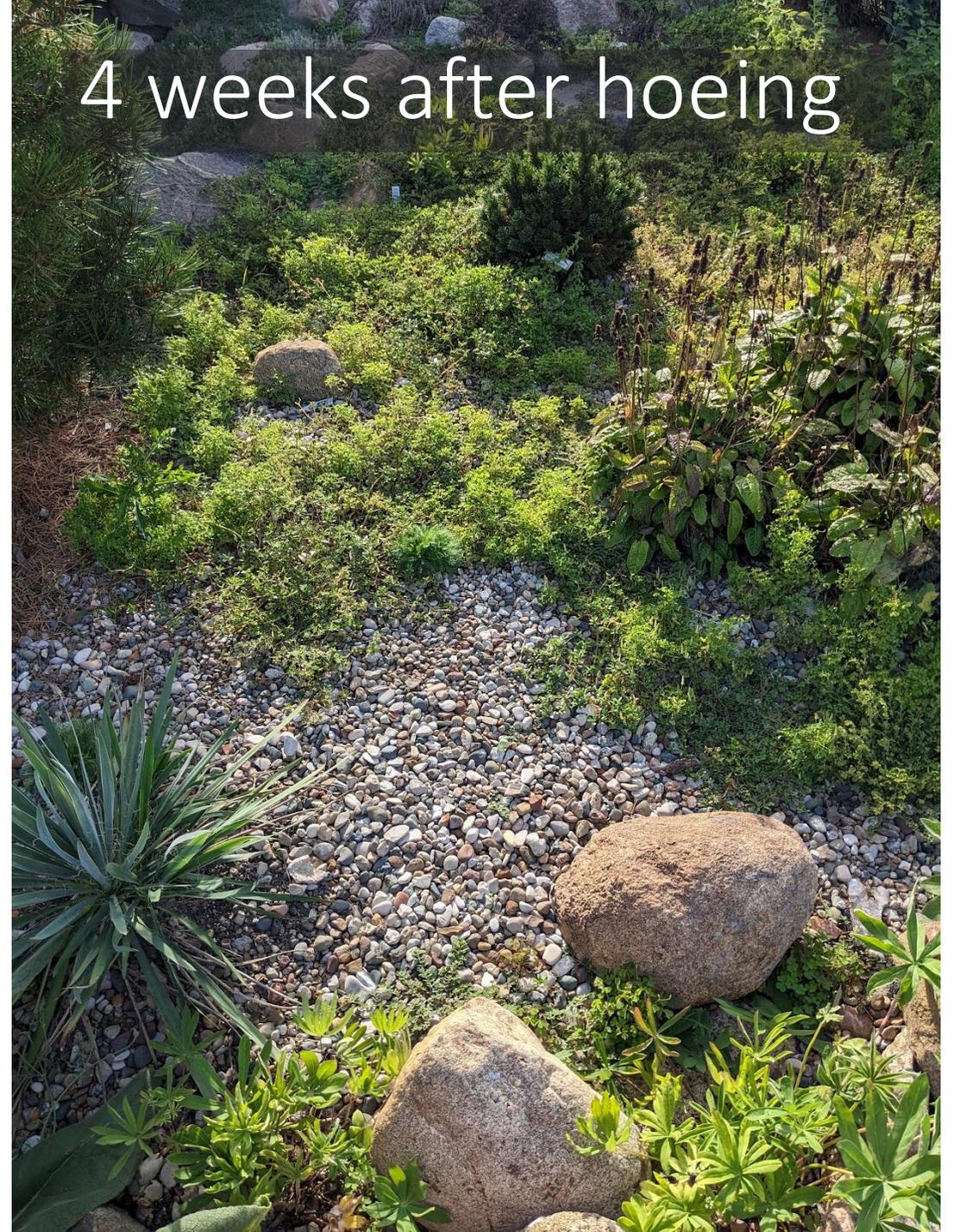


Lavandula Sweet Romance®

4 weeks after hand pulling



4 weeks after hoeing



Thick layer of annuals cuts down on weeding, know your seedling identification



Kill lots of plants: zone push things you aren't sure about being hardy



Agastache Meant to Bee® 'Queen Nectarine'
Kniphofia Pyromania® 'Flashpoint'

Find Your Plants

Find plants you love for all your projects.

Search Plants

Zone

Plant Type

Colors

Light Level

Available Online

SEARCH



Recommended Idea Boards
Browse Idea Boards put together by garden influencers, plant enthusiasts, and Proven Winners staff members.

[Advanced Plant Search](#)
[Container Garden Decide Search](#)

SIGN UP!



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Native North American Beauties

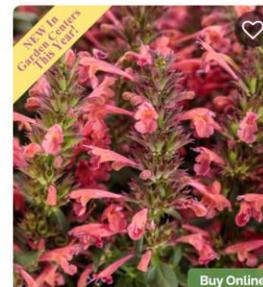
by Proven Winners

Looking to add some local flair to your garden? Enjoy this collection of North American native cultivars! A native cultivar is a plant that results when native parent plants are used to breed a new cultivar. Learn more at provenwinners.com/Native.



Maestro® Gold
hummingbird mint
Marked in stock

Buy Online



Maestro® Coral
hummingbird mint
Marked in stock

Buy Online



Art & Sol® Silver Fox
Mangave
Marked in stock

Buy Online



Art & Sol® Purple People Eater
Mangave
Marked in stock

Buy Online



Proven Winners Plants

Proven Winners® branded plants have been specially developed and proven in trials conducted in numerous sites worldwide. [Click here for more info.](#)



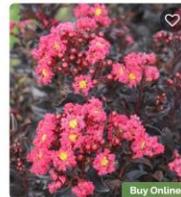
Rikki Tikki® Pink
Copernytia



Rikki Tikki® Rouge
Copernytia

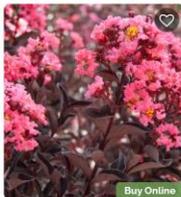


Infinitini® Watermelon®
Copernytia



Center Stage® Pink
Copernytia

Buy Online



Center Stage® Coral
Copernytia

Buy Online



Infinitini® Brite Pink
Copernytia



Infinitini® Orchid
Copernytia

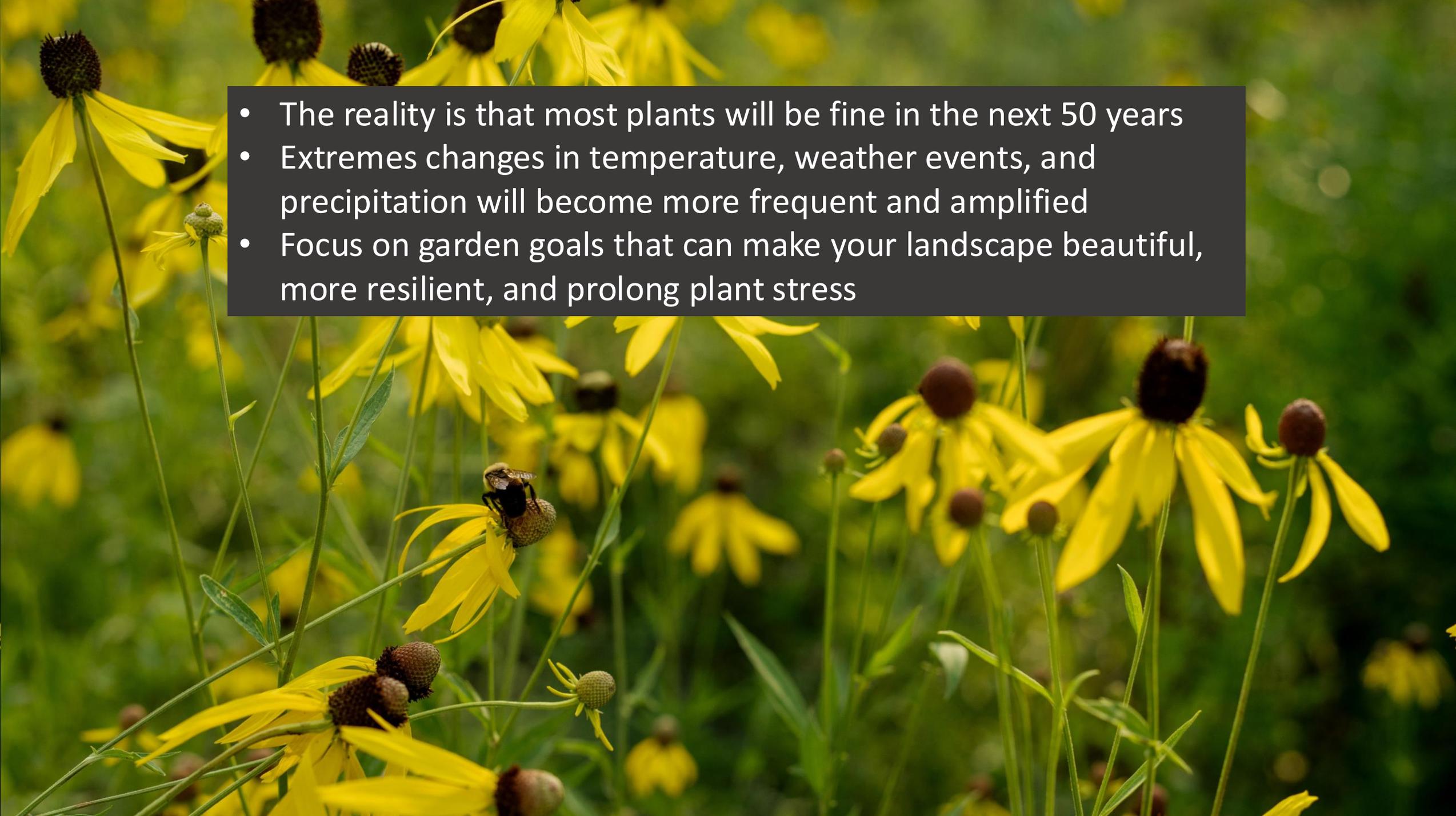


Infinitini® Magenta
Copernytia

Managing naturalistic landscapes:

- Consider the whole site, including history and future
- Set actionable goals and steps to achieve them
- Borrow tricks from other fields
- Time savings will be substantial over time
- Realize that changes will be small over time without starting over completely



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- A close-up photograph of a field of yellow Black-eyed Susans. The flowers have bright yellow petals and dark brown, textured centers. A single bee is perched on one of the flowers in the lower-left quadrant. The background is a soft-focus green field of more flowers.
- The reality is that most plants will be fine in the next 50 years
 - Extremes changes in temperature, weather events, and precipitation will become more frequent and amplified
 - Focus on garden goals that can make your landscape beautiful, more resilient, and prolong plant stress

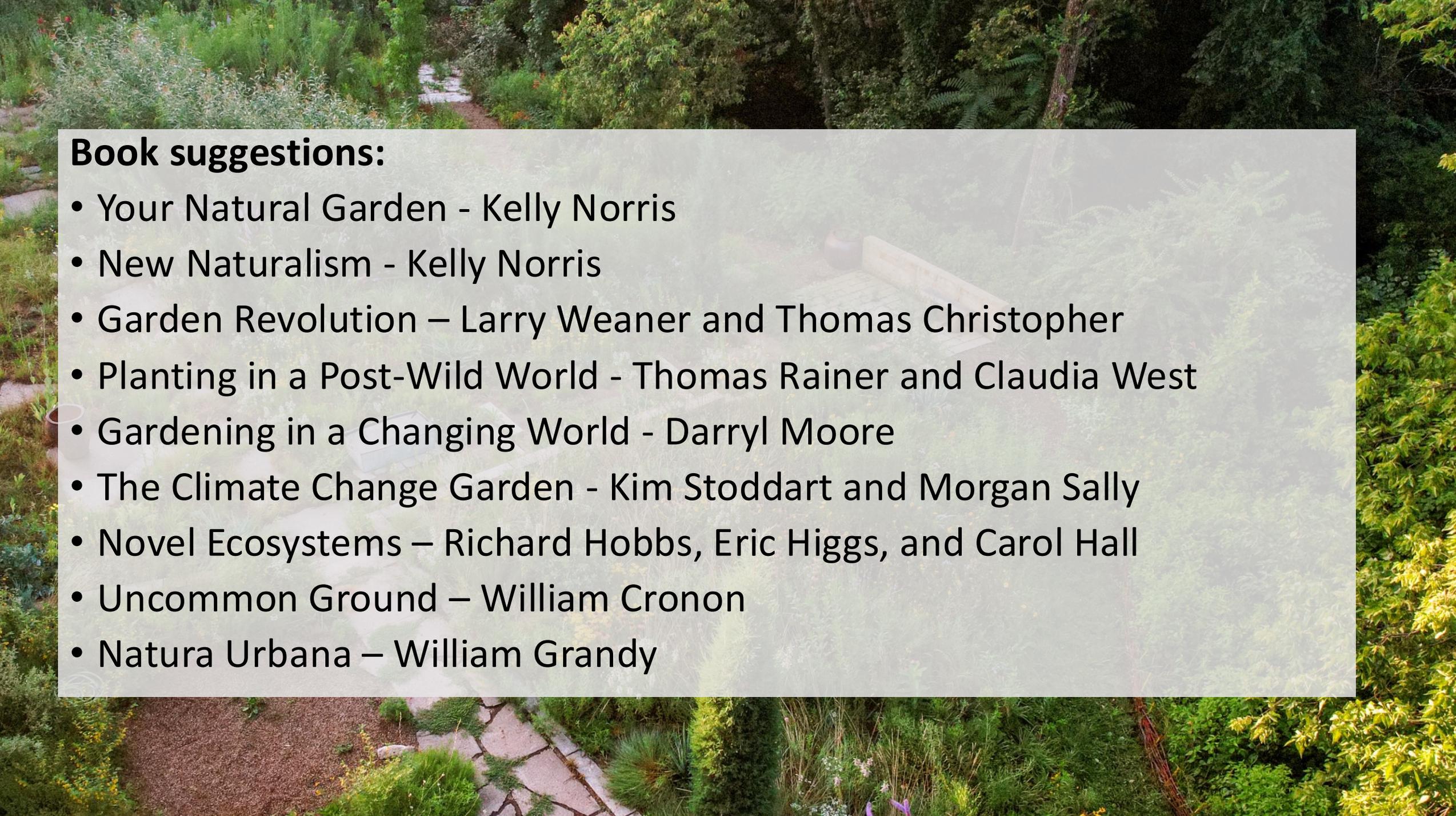
Where to get PW plants:



Where to get native plants:

- Prairie Moon Nursery
- New Moon Nursery
- North Creek Nursery
- Hoffman Nursery
- Pizzo Native Plant Nursery
- Izel Plants
- Taylor Creek Restoration Nursery
- Hundreds of local options & almost anywhere you buy plants have natives



A lush garden scene with a stone path, green plants, and trees. The path is made of irregular stones and is surrounded by various green plants and flowers. In the background, there are tall trees and a dense canopy of leaves. The overall atmosphere is peaceful and natural.

Book suggestions:

- Your Natural Garden - Kelly Norris
- New Naturalism - Kelly Norris
- Garden Revolution – Larry Weaner and Thomas Christopher
- Planting in a Post-Wild World - Thomas Rainer and Claudia West
- Gardening in a Changing World - Darryl Moore
- The Climate Change Garden - Kim Stoddart and Morgan Sally
- Novel Ecosystems – Richard Hobbs, Eric Higgs, and Carol Hall
- Uncommon Ground – William Cronon
- Natura Urbana – William Grandy

Thank you!



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