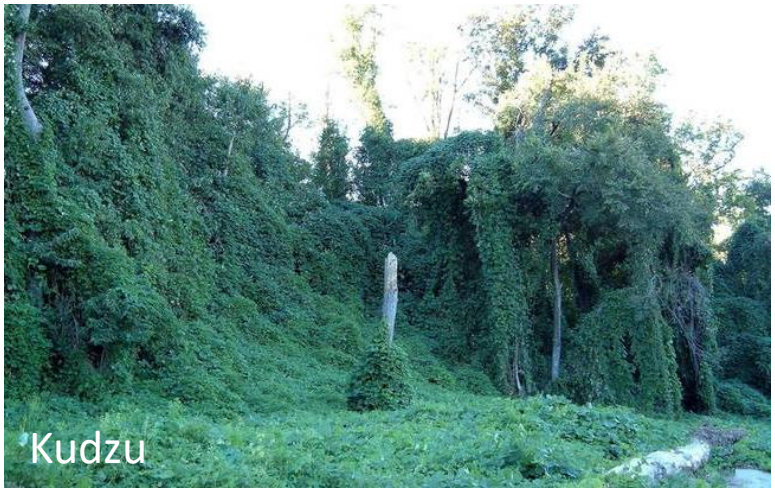
Design Considerations: Functionality of Plants in a Garden

By: James Dillon, PCH

Todays challenges: Invasive Plants



Deer Herbivory

Pressures on plant communities and wildlife

- Habitat loss
- Habitat fragmentation
- Climate change
- Deer herbivory
- Pollution
- Pesticides
- Invasive plants and animals
- Drought/flooding

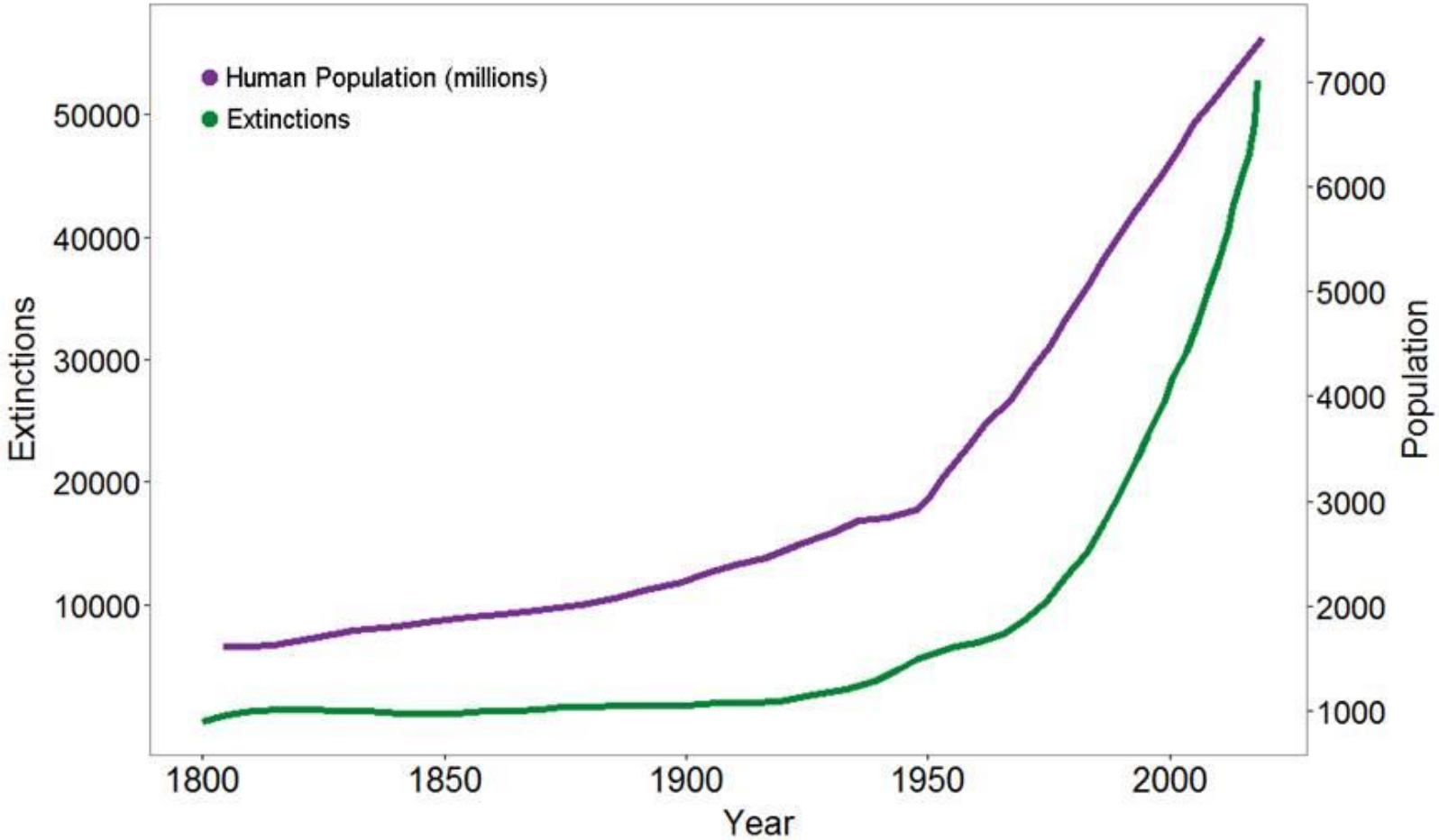
What does this mean?

- Decline of pollinators due to lack of food, diminishing habitat and pesticides
- Decline of insects in general
- Leads to decline of birds (most birds need insects to feed to young and plants for seeds in winter/cover)
- Leads to drop in diversity of species
- Leads to lack of balance in environment which favors invasive species and further degradation

Rusty Patched Bumble Bee

By USGS Bee Inventory and Monitoring Lab from Beltsville, Maryland, USA

Humans & The Extinction Crisis

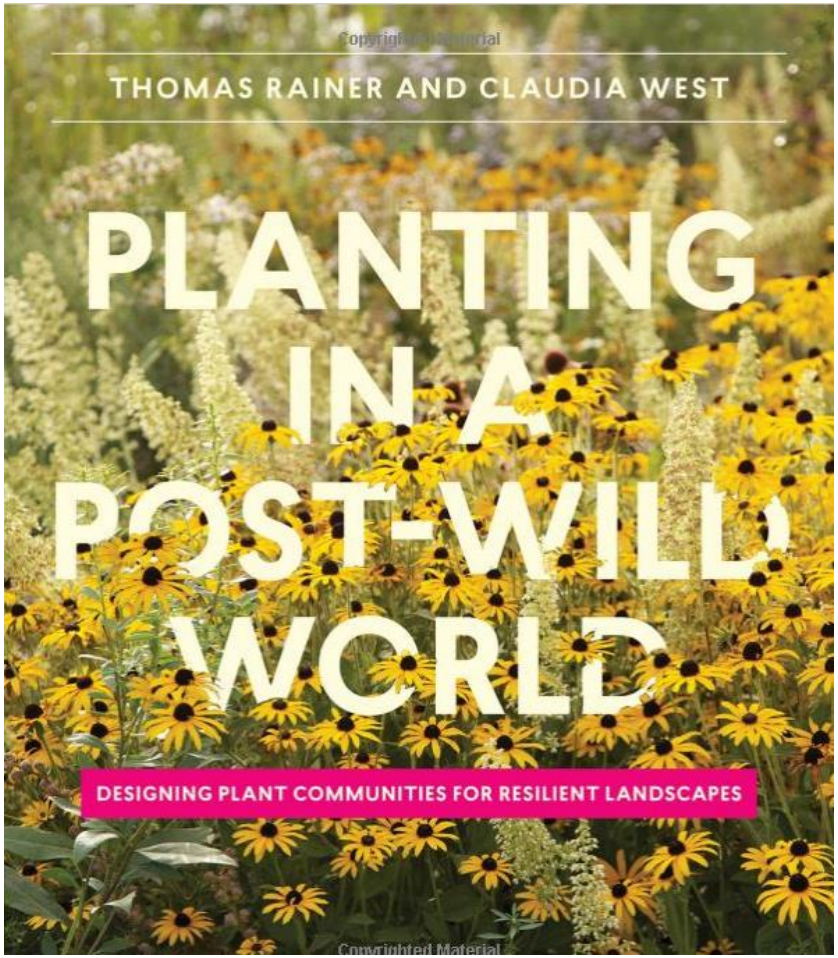


Data source: Scott, J.M. 2008. *Threats to Biological Diversity: Global, Continental, Local.* U.S. Geological Survey, Idaho Cooperative Fish and Wildlife, Research Unit, University Of Idaho.

“All hands on deck” approach

- Conservation of habitat
- Invasive plant management
- Agriculture practices (e.g. pollinator strips)
- Roadside planting/management
- Public land management
- Private land management
- Reduced/responsible pesticide use
- Residential gardens

Inspiration and how-to



Courtesy of Timber Press

Novel Plant Communities

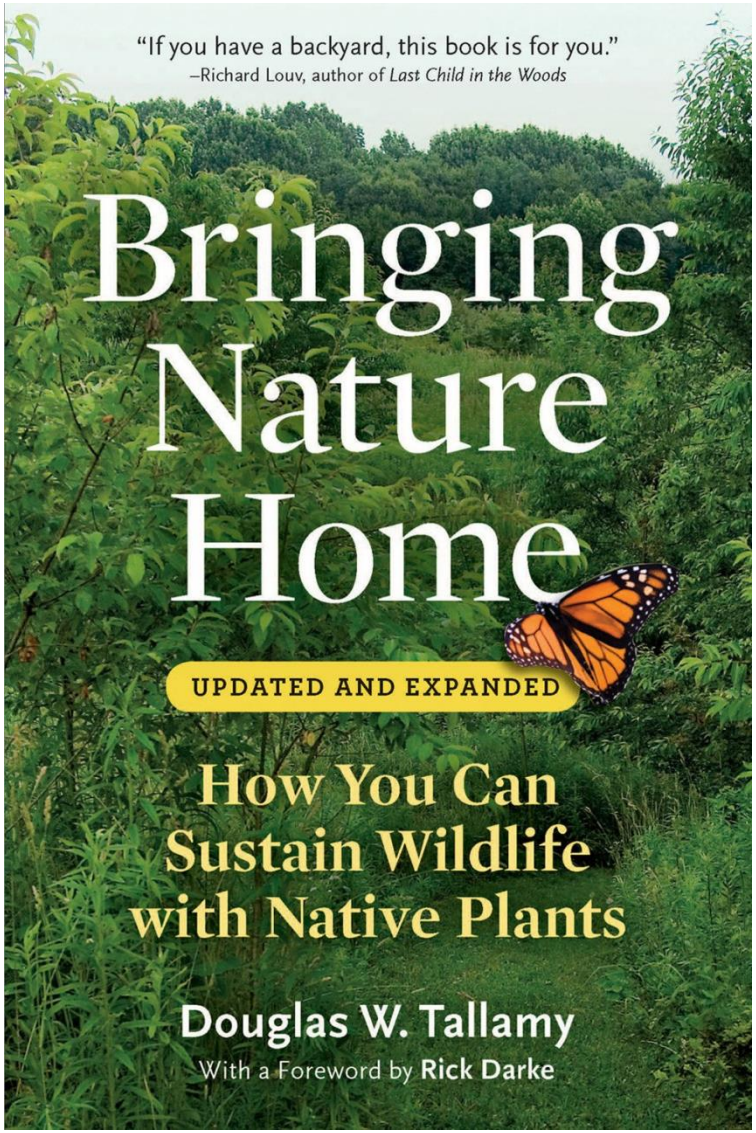
Olympic Gardens Stratford, England

Design by: James Hitchmough

Getting the most "bang for the buck"

Limited space in our yards means we have to make every inch count

- **Specific plants** are required by certain **caterpillars** (e.g. Butterflies and Moths)
- **Super Genera** are plants that feed many insects and **host MORE** butterflies/moths
- Planting for **continuous bloom** from spring through fall
- **Limit/eliminate insecticide** use
- **Control invasive** plants so native plant communities thrive



Caterpillar = Bird Food

Doug Tallamy's List, Plant Genera	Ranked In Terms of Number of Caterpillar Species They Support	Common Name
Gardening With Confidence	Gardening With Confidence	Gardening With Confidence
Quercus	557	Oaks
Prunus	456	Cherries
Salix	455	Willows
Betula	411	Birches
Populus	367	Populars
Malus	308	Crabapples
Acer	287	Maples
Vaccinium	297	Blueberries
Alnus	255	Alders
Carya	235	Hickories
Ulmus	215	Elms
Pinus	201	Pines
Crataegus	168	Hawthorns
Rubus	163	Bramble berries
Picea	150	Spruces
Fraxinus	149	Ashes
Tilia	149	Linden
Pyrus	138	Pears
Rosa	135	Roses
Corylus	131	Filberts
Juglans	129	Walnuts
Castanea	127	Chestnuts
Fagus	127	Beeches
Amelanchier	124	Serviceberry
Larix	121	Larches
Cornus	118	Dogwoods
Abies	117	Firs
Myrica	108	Bayberries
Viburnum	104	Viburnums
Ribes	99	Currents
Ostrya	94	Hop Hornbeam
Tsuga	92	Hemlocks
Spiraea	89	Spireas
Vitis	79	Grapes
Pseudotsuga	76	Douglas for
Robinia	72	Locusts
Carpinus	68	Hornbeans
Sorbus	68	Mountain ashes
Comptonia	64	Sweetfern
Hamamelis	63	Witchhazels
Rhus	58	Sumacs
Rhododendron	51	Rhododendrons
Thuja	50	Arborvitaes
Diospyros	46	Persimmons
Gleditsia	46	Honey Locusts
Ceanothus	45	New Jersey Tea
Platanus	45	Sycamores
Gaylussacia	44	Huckleberry
Celtis	43	Hackberry
Juniperus	42	Junipers
Sambucus	32	Elders
Physocarpus	41	Ninebark
Syringa	40	Lilacs
Ilex	39	Ilex
Sassafras	38	Sassafras
Lonicera	37	Honeysuckles
Liquidambar	35	Sweetgums
Kalmia	33	Mountain laurel
Aesculus	33	Buckeyes
Parthenocissus	32	Virginia Creeper
Photinia	29	Photinias
Nyssa	26	Black Gums
Symphoricarpos	25	Snowberries
Cydonia	24	Quince
Ligustrum	24	Privats
Shepherdia	22	Buffaloberries
Liriodendron	21	Tulip Trees
Magnolia	21	Magnolias
Cephalanthus	19	Buttonbush
Cercis	19	Redbuds
Smilax	19	Green-brier
Wisteria	19	Wisterias

Another useful list from Dr. Tallamy

Herbaceous Plants

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

Canada Goldenrod at The Center for Environmental Stewardship 9/24/16

Butterfly Weed
Asclepias tuberosa

Design with the end in mind

- **Identify goals of the planting**
  - Ecological value
  - Home foundation planting designed with high aesthetics/winter interest, to work with architecture/infrastructure, while lowering maintenance and being ecologically valuable
  - Pollinator garden or Monarch waystation in public area
  - Soil stabilization
  - Lawn reduction
  - Lower maintenance
  - Green mulch/less mulching
  - Permaculture/food
  - Aesthetic goals
  - Screening/frame views
  - Garden rooms
  - Other functions (e.g. meadow/reforestation)

All plantings require maintenance

Decide what level of maintenance from the start!

- Decide how your planting will be managed right from the design phase
  - **Vigorous spreading plants** can cut back on maintenance but limits species diversity (i.e. "thug" taking over)

    - Vigorous plants can **get out of hand** so it's necessary to **learn how it spreads** and its **active growth period**

    - Not ecologically valuable for many species!
  - **Diverse/layered plantings** can also be low maintenance if designed properly

    - **Supports diversity of species** of insects and birds promoting balanced systems

    - Can evoke **natural ecosystems** and be **beautiful**

Plant Profile: Short-toothed Mountain Mint

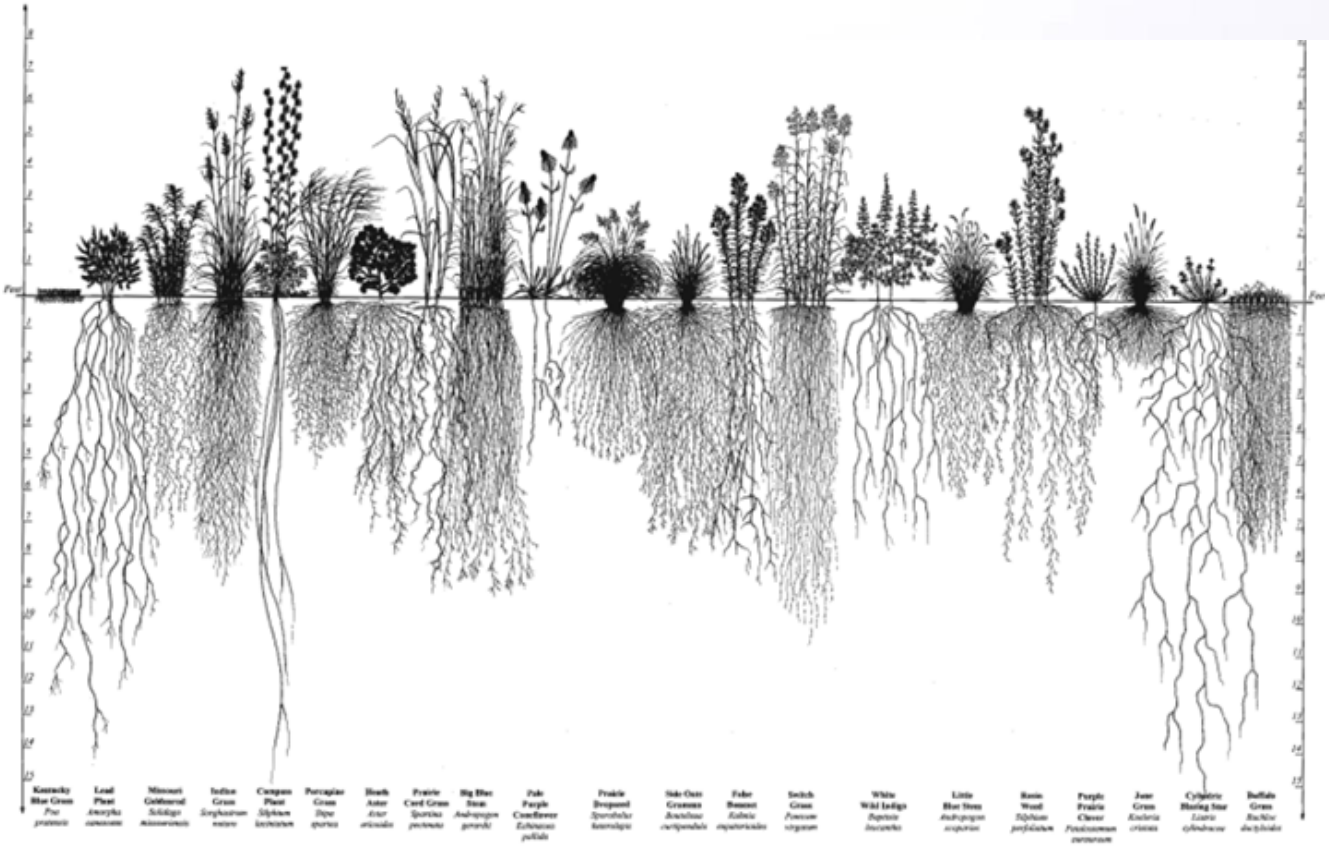
Pycnanthemum muticum

Mountain Mint 2016.r

Monoculture vs. Diverse Planting

A singe species leaves a lot of ground that requires mulch to stabilize:

A diversity chosen carefully can occupy separate niches above and below ground:



Plants with complimentary shapes above and below ground fit more tightly together and tolerate being side by side.

Lowering Garden Maintenance Requires Looking at Plants as Functional Entities and Changing Old Patterns

- **Maintenance** becomes **knowledge-based** instead of **labor-based**
- **Less mulching = Plants as Green Mulch**
- **Less weeding = Layered planting with no bare ground**
- **Less Pruning =** Work becomes **MONITORING** and **managing** perennial planting replace traditional need to sheer and thin shrubs
  - **Layered Planting from "Planting in a Post-Wild World"** Plants that occupy various niches in the garden:
    - **Ground Cover Plants** (50%)
    - **Seasonal Theme Plants** (25-40%)
    - **Structural Plants** (10-15%)
    - **Filler Plants** (5-10%)

Plants Organized According to Function in the Garden or Plant Community

Botanic Name	Common Name	Type	Function	Ecological Value Notes	green Basal Foliage	Deer Resistance	Additional Comments
Allium cernuum	Nodding Onion	perennial	Filler Plant	Nectar source, attracts hummingbirds and butterflies	yes	high	12-18", fills in bare soil areas (deadhead if reseeding not desired), very drought tolerant and adaptable
Aquilegia canadensis	Eastern Red Columbine	perennial	Filler Plant	Larval host plant, Nectar source, attactive to Hummingbirds	yes	high	1-3', drought and tolerand, best with some shade, requires good drainage,
Coreopsis tinctoria	Plains Coreopsis	perennial	Filler Plant	Nectar source, attracts birds and butterflies	no	high	1-2', full sun to part shade, moist soil, short-lived perennial that can naturalize by seeding
Geranium maculatum	Spotted Geranium	perennial	Filler Plant	Nectar source	no	low	1-2', moist to dry soil, part shade to shade
Lobelia cardinalis	Cardinal Flower	perennial	Filler Plant	Nectar plant, attracts birds, butterflies, hummingbirds	yes	moderate	2-5', Red flowers for weeks during summer, best in moist soil, short-lived but can seed into scarified soil (e.g. creek bank)
Penstemon digitalis	Beardtongue	perennial	Filler Plant	Larval host plant, nectar plant	yes	high	special value to native bees
Penstemon smallii	Small's Beardtongue	perennial	Filler Plant	Larval host plant, nectar plant	yes	high	special value to native bees
Rudbeckia hirta	Brown-eyed Susan	perennial	Filler Plant	Larval host plant, nectar plant, attracts birds and bees	no	high	1-2', short-lived, but good temporary cover with flowers
Sisyrinchium angustifolium 'Lucerne'	Lucerne' Blue Eyed Grass	perennial	Filler Plant	Nectar plant, other wildlife value	yes	high	12", short-lived perennial with small Iris-like foliage, can perpetuate by seeding, prefers moist to average soil
Arctostaphylos uvi-ursa	Bearberry	perennial	Ground Cover	Larval host plant, nectar plant	yes	high	4" tall, sun to part shade, requires good drainage (not clay)
Asarum canadensis	Wild ginger	perennial	Ground Cover	Larval host plant, other wildlife value	no	high	6-12", Inconspicuous flower, thick g/c for shade and drought tolerant
Aster divaricatus 'Eastern Star'	Eastern Star' White Wood Aster	perennial	Ground Cover	Larval host plant, nectar plant	yes	moderate	18-24", tolerates dry shade under other plants, hosts Pearl Cresent and Checkerspot
Carex amphibola	Creek Sedge	sedge/grass/rush	Ground Cover	Larval host plant, nectar plant, seeds for birds	yes	high	12-18" tall, moist soil, sun to shade, wet to dry, adaptable
Carex appalachica	Appalachian Sedge	sedge/grass/rush	Ground Cover	Larval host plant, nectar plant, seeds for birds	yes	high	12", tolerates dry shade, tidy clumping habit
Carex cherokeensis	Cherokee Sedge	sedge/grass/rush	Ground Cover	Larval host plant, nectar plant, seeds for birds	yes	high	12-18" tall, moist to dry, sun to shade
Carex eburnia	Bristleleaf Sedge	sedge/grass/rush	Ground Cover	Larval host plant, nectar plant, seeds for birds	yes	high	6-8" tall, sun to shade, tolerates limestone soil and drought
Carex pennsylvanica	Pennsylvania Sedge	sedge/grass/rush	Ground Cover	Larval host plant, nectar plant, seeds for birds	yes	high	6-12" tall, dry shade, rhizomatous
Carex plantaginea	Seersucker Sedge	sedge/grass/rush	Ground Cover	Larval host plant, nectar plant, seeds for birds	yes	high	6-12" tall, moist shade to part shade, wider blade than most
Chrysogonum virginianum	Gold Star	perennial	Ground Cover	Nectar plant, other ecological value	yes	high	4-6" tall, part sun to part shade, moist/well-drained soil

Groundcovers with Semi-Evergreen to Evergreen Basal Foliage (50% of planting)

Carex eburnea (Ivory Sedge)

'Eastern Star' White Wood Aster

Chrysogonum virginianum (Gold Star)

Groundcovers in Action

February 2016

Seasonal Theme Plants (25-40% of planting)

Aster 'October Skies'

Butterfly Weed

Structural Plants (10-15% of planting)

'Jacob Cline' Bee Balm

'Gateway' Joe Pye Weed

Little Bluestem

Filler Plants (5-10% of planting)

Wild Columbine

Wild Geranium

Cardinal Flower

Limiting factors

-Learn to work with the conditions on a site rather than attempting to alter. Attempts to alter the site can result in more issues dealing with weeds.

- **Existing vegetation**
- **Sun/Shade**
- **Wet/Dry Soil**
- **Drainage/Hydrology**
- **Soil pH**
- **Exposed/Windy site**
- **Deer herbivory**
- **Reflected heat**
- **Aspect (e.g. direction slope facing)**
- **Soil fertility**
- **Engineered soil**
- **Salt exposure**

Aesthetics

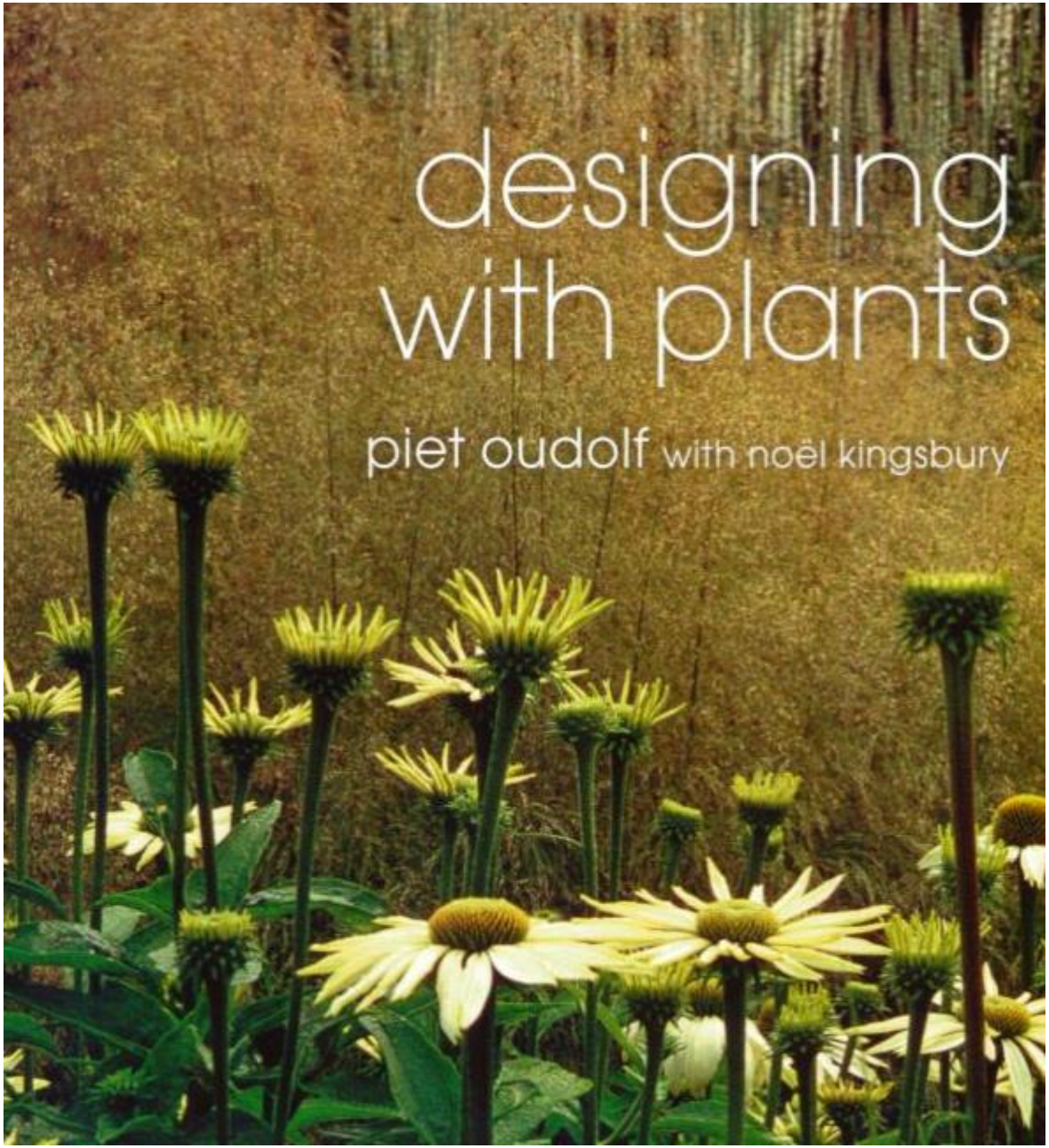
- In order for my plantings to be successful, they need to be aesthetically pleasing to have a beneficial affect on people.

Piet Oudolf

…even during winter!

But how?

Piet Oudolf


designing
with plants
piet oudolf with noël kingsbury

Physical Traits: Form and Flower Shape from Piet Oudolf's- "Designing with Plants"

Iris 'Carsar's Brother'

'Karmina' Geranium

Switchgrass

'Jelena' Phlox

Purple Coneflower

'Little Joe' Joe Pye Weed

'Blue Fortune' Agastache

Swamp Milkweed

An amplified or enhanced depiction of nature

Piet Oudolf

Form and Winter Interest

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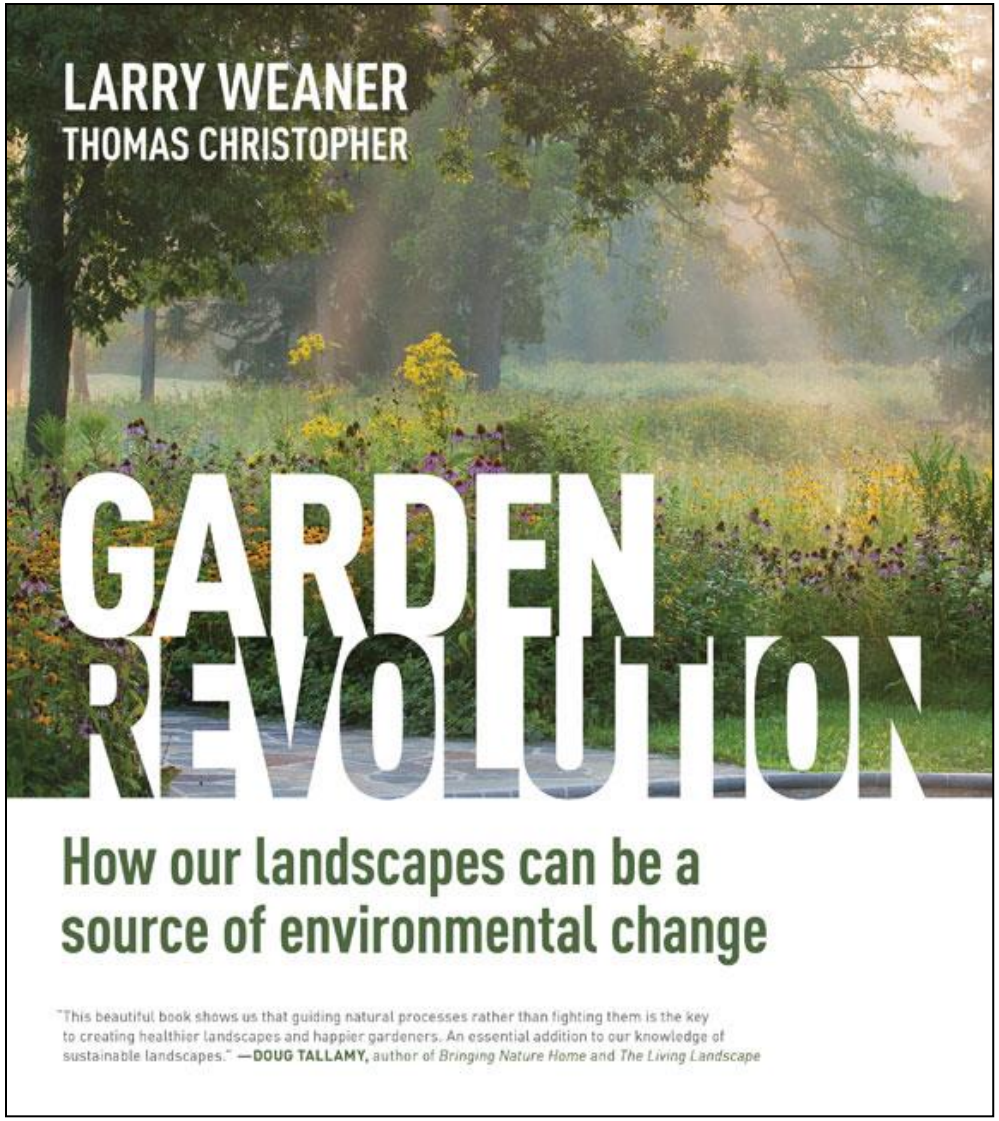
Foliage/Flower Textures and Forms

Piet Oudolf, NY High Line Park

Monarch Waystation, Kiwanis Park

Design by: James Dillon

More required reading:



Thank you!

References and Websites

- Rainer, Thomas, and Claudia West. Planting in a post-wild world: designing plant communities for resilient landscapes, OR: Timber Press, 2015. Print
- http://www.fairfaxcounty.gov/parks/greenspring/infosheets/butterfliesandmoths.pdf
- http://www.wildtypeplants.com/butterfly.pdf
- http://www.northcreeknurseries.com/
- https://www.nps.gov/plants/alien/pubs/midatlantic/midatlantic.pdf
- http://www.newmoonnursery.com/
- New York Invasive Species Information
- http://www.loudounwildlife.org/PDF
- http://www.gloucesterva.info/Portals/0/mg/documents/HelpDesk/LocalGardening/ButterfliesBees/NativePlantsButterflyHost.pdf
- http://www.bringingnaturehome.net/what-to-plant.html
- http://gardeningwithconfidence.com/blog/wp-content/uploads/2015/11/Doug-Tallamys-List.pdf
- http://www.biologicaldiversity.org/programs/population_and_sustainability/extinction/