

Planting Natives Using Real Ecosystems As A Guide

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Wild Ones, Kalamazoo MI

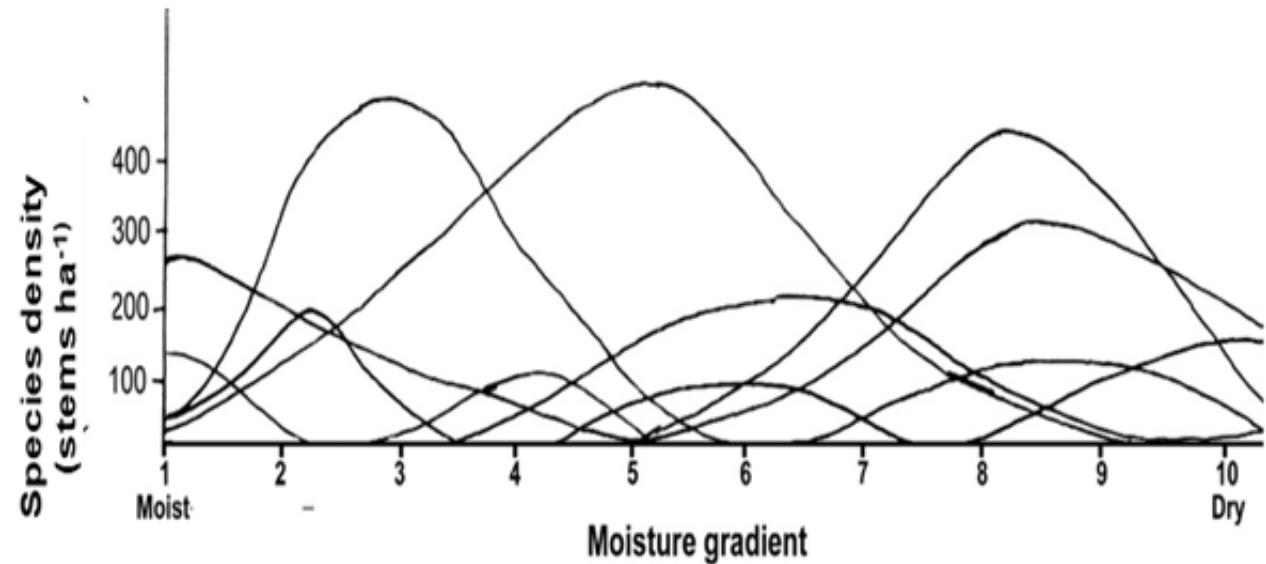
7pm, January 25, 2022

Goals of This Presentation

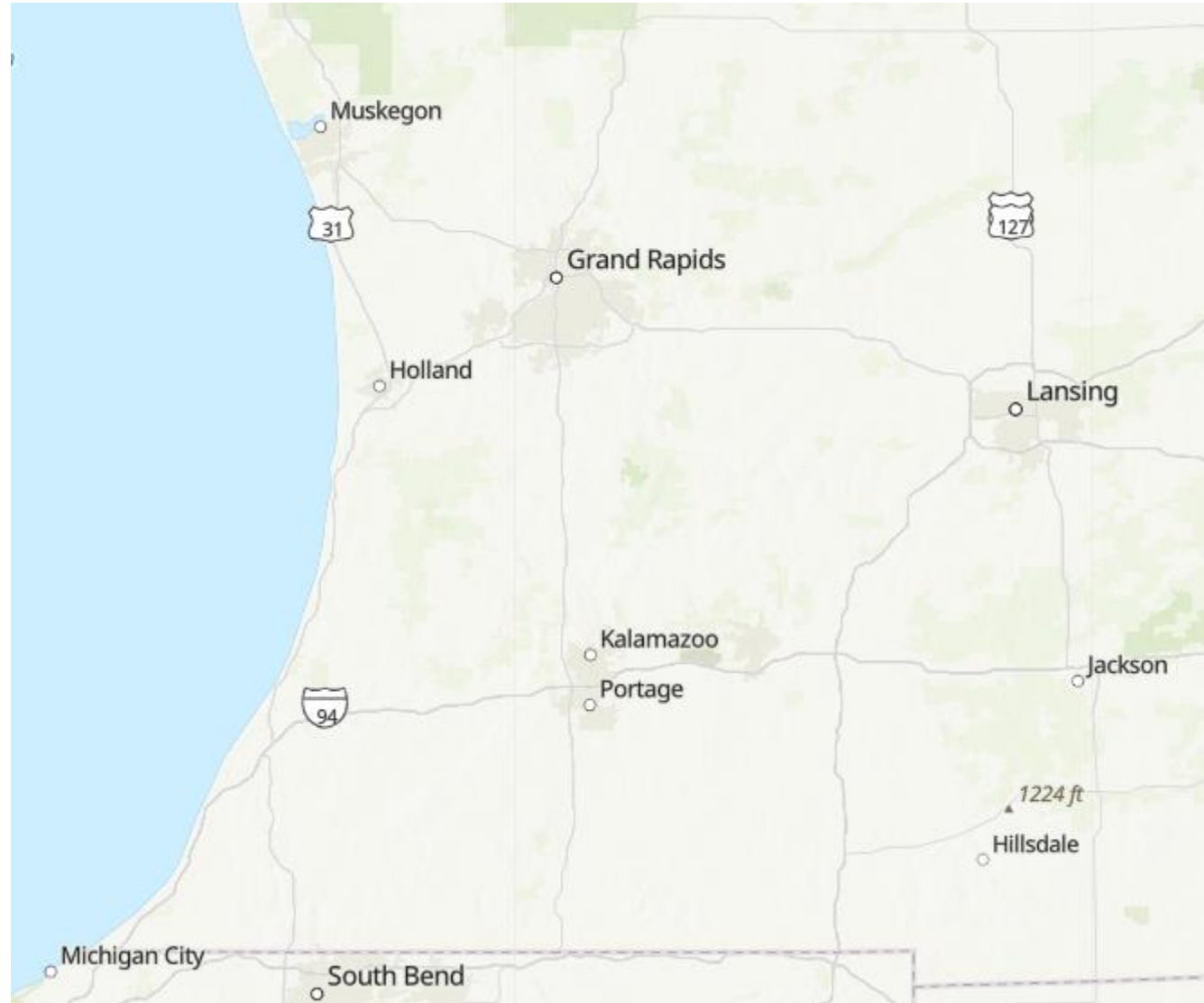
- Learn to Recognize Ecosystem Types
- Learn How to Identify Ecosystem Types in Your Project
- Learn How to Use Reference Materials to Pick Species for Planting

Why is it a Good Tool for Planting Native Species?

- Self-regulating collection of plants in a specific environment: climate, soil, etc.
- “Art Imitates Nature”
 - What will grow well in this setting, with which other species?
 - Better chance of establishing and thriving despite future change
 - Interactions among species – some known, most unknown; e.g., bee/flower associations at species & family levels; hemiparasitic plant species



What Ecosystems are in Southwest Michigan?



What Ecosystems are in Southwest Michigan?

ECOSYSTEM	SITE CONDITIONS	CHARACTERISTIC PLANTS
Prairie (Dry to Wet)	Wet to dry sandy to loamy soil	Warm- and cool-season grasses, sedges, forbs
Oak Savanna (Barrens, Openings)	Dry sandy to loamy soil; outwash, moraines	Oaks, sparse understory, mix of sun-requiring and shade-tolerant plants of prairies and woodlands
Oak-Hickory Forest	Dry loamy soil; hilltops, southerly slopes	Oaks, pignut hickory, red maple, walnut, cherry, hazelnut, raspberry/blackberry, grasses, sedges, forbs
Beech-Maple Forest	Moist loamy soil; valleys, northerly slopes	Beech, sugar maple, yellowbud/shagbark hickory, red oak, ironwood, tuliptree, sedges, spring ephemerals, other forbs
Hardwood Swamp & Floodplain Forest	Saturated to flooded loamy to sandy soil	Elm, silver maple, cottonwood, sycamore, box elder, black willow, oaks, grasses, sedges, forbs
Hardwood-Conifer Swamp	Saturated organic soil	Red maple, black ash, yellow birch, white pine, white cedar, willow, ferns
Shrub Swamp	Saturated soil	Dogwood, willow, Michigan holly, poison sumac, tamarack
Wet Meadow	Saturated soil, wetter	Sedges, grasses, shrubs, forbs
Marsh	Soil below water level	Cattail, bulrush, arrowhead, bur-reed, pickerelweed
Bog & Fen	Saturated peat or muck	Specialized grasses, sedges, forbs, shrubs and trees

- Prairie (Dry to Wet)

- Several types
- Dry to wet & sand to loam; no true blacksoil prairies
- Maintained by fire and grazing
- The wetter the soil, the taller the plants
- Dominated by early and mid-summer blooming grasses (cool- and warm-season), with sedges
- Many plant species in a square meter



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- Oak Barrens (Savanna)

- Dry, sandy soil
- Fire prone
- Patchy trees & shrubs OR broken tree canopy
- Oaks dominate
- Grasses, sedges, forbs need sun or semi-shade



- Oak-Hickory Forest (Dry & Dry-Mesic S. Forest)

- Many once oak savanna (openings)
- Loamy soil
- Fire prone
- Continuous tree canopy
- Open canopy of oaks & hickories
- Some spring ephemerals
- Most herbs best in semi-shade



Jeffrey Lee MNFI

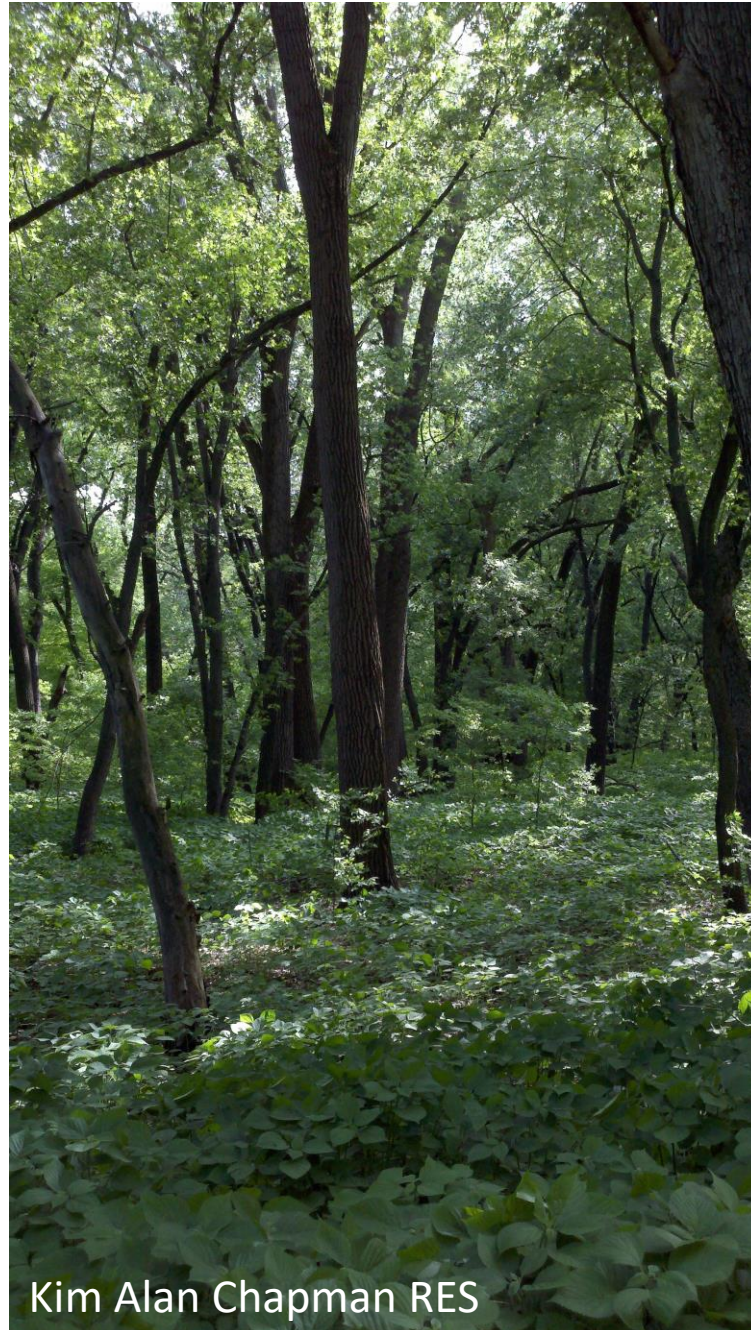
- Beech-Maple Forest (Mesic S. Forest)

- Loamy soil
- Continuous canopy & four vegetation layers
- Maple, tulip tree, etc. have dense crowns
- Deep shade
- Many spring ephemerals
- Summer & fall herbs not showy



- Hardwood Swamp, Floodplain Forest

- Basins (swamps); river valleys (floodplain forests)
- Saturated (swamp); flooded (floodplain)
- Continuous canopy, open understory
- Red maple, silver maple, swamp white & bur oak, willow, cottonwood, elm & ash (once), many other tree species
- Often few species dominate ground: ferns, wood nettle, touch-me-not, etc.



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- Hardwood-Conifer Swamp

- Basin or valley
- Saturated organic soil (often on clay)
- Continuous canopy
- Many tip-ups (pits & mounds) due to shallow rooting
- Red maple, black ash (once), yellow birch, white pine, white cedar
- Often few species dominate ground: ferns, sedges, etc.



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- Shrub Swamp
(Shrub-Carr)

- Often colonizing fens, bogs, wet prairies & meadows – drying of soil (shrubs make worse)
- Saturated organic soil
- Dominated by dogwood, willow, Michigan holly, swamp rose, poison sumac
- Sedges and bluejoint grass, with forbs, beneath shrubs



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- Wet Meadow

- Valleys, shoreline settings
- Saturated muck to loam soil
- Maintained by fluctuating water level
- Few species dominate: tussock sedge, other sedges, blue-joint reed grass, other grasses
- Joe pye weed, boneset, sensitive fern, iris, swamp milkweed, etc.



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- Marsh

- In depressions and along shorelines of streams, rivers, lakes
- Inundated muck, sand, silt, clay soil
- Maintained by water level
- Dominated by a few species: cattail, bulrush, bur-reed, sedges, spike rush, pickerelweed, arrowhead



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• Bog & Fen

- In depressions (bogs) & where moraines meet outwash valleys (fens)
- Saturated peat (bogs) or muck & marl (fen)
- Maintained by water level & sphagnum (bog) or groundwater (fen)
- Many species in a square meter (fen); orchid-rich (bog & fen)
- Sphagnum & ericads dominate bogs; prairie grasses & sedges dominate fens



Matthew J. Lewis, Mich. Aerospace Corp.



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Clues: Planting Native Species as an Ecosystem

- What are the site conditions?
 - Soil texture
 - Sandy, loamy, clayey, mucky/peaty
 - Soil moisture
 - Dry, moist, sometimes saturated, always saturated, inundated, periodically flooded
 - Amount of tree shade
 - Trees shade 50-100% of ground (forest/woodland); 10-50% (savanna); <10% (grassland)
 - Slope position and direction slope faces (aspect)
 - Top or bottom of slope; or valley bottom
 - Steep or gentle slope
 - Northerly versus southerly
 - Cues from surrounding plant life
 - Lots of oaks and grasses
 - Lots of sedges and ferns
 - Lots of shade tolerant plants

What Reference Materials Exist As Guides?

Online Resources

- Web Soil Survey, US Geological Survey. <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>
- My Vegetation Circa 1800 Viewer. Michigan Natural Features Inventory, Michigan State University Extension. <https://mnfi.maps.arcgis.com/apps/StorytellingSwipe/index.html?appid=c285e9eab9774c77a36d8726474fa408#>
- *A Field Guide to the Natural Communities of Michigan*. 2015. J.G. Cohen, M.A. Kost, B.S. Slaughter, D.A. Albert. Mich. Nat. Features Inventory, Mich. State Univ. Press, East Lansing, MI. <https://mnfi.anr.msu.edu/publications/abstracts>
- *Field Manual of Michigan Flora*. E.G. Voss & A.A. Reznicek. 2012. Univ. Mich. Press, Ann Arbor, MI. <https://lsa-miflora-p.lsa.umich.edu/>

Publications

- *A Field Guide to Wildflowers of the NE and North-Central U.S.* 1998. M. McKenny & R.T. Peterson, Houghton Mifflin Co., Boston, MA.
- *Michigan Shrubs and Vines*. 2016. B. Barnes, C. Dick, M. Gunn. Univ. Mich. Press, Ann Arbor MI.
- *Michigan Trees (Revised)*. 2004. B. Barnes & W.H. Wagner, Jr. Univ. Mich. Press, Ann Arbor MI.
- *How to Know the Ferns & Fern Allies*. 1979. J.T. Mickel. Wm. C. Brown Co., Dubuque IA.
- *The Vegetation of Wisconsin*. 1974. J.T. Curtis. Univ. Wisc. Press, Madison, WI.
- *Prairie and savanna in southern Lower Michigan: History, classification, ecology*. 2008. K.A. Chapman & R. Brewer. *Michigan Botanist*, W. Mich. Univ., Kalamazoo MI.
- *Prairies and savannas in Michigan*. 2009. J.G. Cohen, M.A. Kost, R.P. O'Connor. Mich. State Univ. Press, E. Lansing MI.

Picking the Right Plants for Your Ecosystems

- Pick the plants which will do best, and in which vegetation layer
 - What dominants are in: canopy, subcanopy, shrub/vine & herbaceous layers?
 - What common species will establish early? (CI number)
 - What are the conservative species to plant later as succession proceeds?
- What density to plant live plugs and quarts of herbaceous plants?
 - 9" or 12" centers for live plugs (32s) – quick coverage, lowest material cost
 - 12" or 18" centers for quarts – bigger impact in first year, higher material cost
 - Gallon plants not efficient & expensive given fast growth of plugs & quarts
- Seeding rate: 40-60 seeds/square foot

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Q&A