

Trees for Our Future

Friends of Roberts Bird Sanctuary

Douglas Owens-Pike, June 22, 2019

The Problem: Climate Disruption

Symptoms observed in Upper Midwest:

- Longer growing season
- Warmer summer nights
- Increased tropical humidity
- Polar vortex
- Locked jet stream flow yielding either extended drought or record flooding
- Increased insect damage
- Stressed plants not adapted to the new climate
- Rapidly declining populations of insects, and birdlife

Possible action steps:

1. Bring genetic material of our native species from populations ~ 200 miles south. Human intervention is required since natural dispersal will not keep up with the rate of climate change.
2. Plant trees with native range further south, but have already been shown to be hardy at our coldest temperatures.
3. Select survivors from these first two lists.
4. Bring new diversity from North America, but species that are found further south, that demonstrate best survival attributes.

Best local reference for native tree identification and selection:

Smith, Welby. *Trees and Shrubs of Minnesota*. University of MN Press. 2008.

Local natives that are most likely to survive climate disruption

Hackberry - *Celtis occidentalis*

Hickory, shagbark – *Carya ovata* and bitternut – *Carya cordiformis*

Kentucky coffee tree – *Gymnocladus dioica*

Oaks, black – *Quercus velutina* and bur - *Quercus macrocarpa*

Walnut – *Juglans nigra*

For use in some locations, but rarely home landscapes:

Cottonwood – *Populus deltoides*

Silver maple – *Acer saccharinum*

Trees native to further south, but already demonstrated to survive in Upper Midwest

Bald cypress - *Taxodium distichum*

Black locust - *Robinia pseudoacacia*

Ohio buckeye - *Aesculus glabra*

Northern catalpa - *Catalpa speciosa*

Ginkgo – *Ginkgo biloba*

Honeylocust - *Gleditsia triacanthos*

Sycamore – *Platanus occidentalis*

Trees native to further south with characteristics predicting likely survival with limited testing:

Black gum - *Nyssa sylvatica*
Hickory, mockernut- *Carya tomentosa*
 Pignut – *Carya glabra*
 Shellbark - *Carya laciniosa*
Pecan - *Carya illinoensis*
Oak, chinkapin or yellow – *Quercus muhlenbergii* (as close as S WI and SE MN)
 Post – *Quercus stellata*
 Scarlet – *Quercus coccinea* (nice stand as close as Madison)
 Shingle – *Quercus imbricaria*
 Southern pin oak – *Quercus palustris*
Sassafras - *Sassafras albidum*
Tulip poplar - *Liriodendron tulipifera*

Further development possible:

Select for cold hardiness from large plots grown from seed, nuts, or propagated from individuals already shown to be winter hardy here.
Breed these survivors for disease and insect resistance.

Plant lists based on research of Dr. Lee Frelich, U of MN Forest Ecologist
<https://www.forestry.umn.edu/people/lee-e-frelich>

WHAT WILL THE FUTURE BRING?

Best case scenario:

Climate at 45 degrees N latitude (Twin Cities Metro) is expected to become more like Central Iowa in the next 50 years. Models vary in their predictions for how soon.

Most likely, unless we aggressively reduce carbon emissions:

Climate at 45 degrees N latitude (Prairie Farm, WI) is expected to become more like Central Kansas in the next 50 years.

NOTE: all climate models have been using conservative assumptions; their predictions have fallen short of how quickly change has been documented.

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Brief description of trees and their habitat

Local native species

Hackberry: moist, organically rich, well-drained soils in full sun. Tolerates part shade. Also tolerates wind, many urban pollutants and a wide range of soil conditions, including both wet, dry and poor soils.

Hickory, shagbark – *Carya ovata*: humusy, rich, moist, well-drained loams in full sun to part shade. This tree needs a very large space within which to grow. It is difficult to transplant because of its deep taproot. Cross-pollination generally produces a more abundant crop of better quality nuts.

Hickory, bitternut – *Carya cordiformis*: humusy, rich, medium to wet, well-drained soils in full sun to part shade. Best performance occurs in moist soils. Plants are generally intolerant of shade. This tree needs a large space within which to grow. It may be difficult to transplant because of long taproot.

Kentucky coffee tree – *Gymnocladus dioica*: moist, organically rich, well-drained soils in full sun. Tolerates poorer soils and drought. Avoid heavy clays however. Also adapts well to urban conditions. Suckers to form colonies in the wild.

Oak, black – *Quercus velutina*: average, acidic, dry to medium moisture, well-drained soils in full sun. Prefers moist, organically rich, well-drained soils, but tolerates poor dry soils. Difficult to transplant because of deep taproot.

Oak, bur - *Quercus macrocarpa*: average, dry to medium, well-drained soils in full sun. Prefers moist well-drained loams, but adapts to a wide range of soil conditions. Good drought tolerance. May take up to 35 years for this tree to bear a first crop of acorns.

Walnut – *Juglans nigra*: moist, organically rich, well-drained soils in full sun. Intolerant of shade. Difficult to transplant because of deep taproot. May be grown for its edible nuts. Although young trees will sometimes begin producing nuts when only 4-6 years old, it usually takes 20 years before a tree will produce a large crop of nuts.

Trees native to further south, but already demonstrated to survive in Upper Midwest

Bald cypress - *Taxodium distichum*: average, medium to wet, moisture retentive but reasonably well-drained soils in full sun. Prefers moist, acidic, sandy soils, but tolerates a wide range of soil conditions ranging from somewhat dry soils to wet soils in standing water.

Black locust - *Robinia pseudoacacia*: average, dry to medium, well-drained soils in full sun. Tolerates some light shade, but avoid shady locations. Tolerates a wide range of soils including sandy or nearly barren ones. Best performance is in moist, organically rich loams. Good drought tolerance. Fixes nitrogen. Avoid pruning in spring when it tends to bleed. Spread by self-seeding and root suckers. Promptly remove suckers as they appear unless naturalization is desired.

Ohio buckeye - *Aesculus glabra*: average, medium, well-drained soils in full sun to part shade. Prefers moist, fertile soils. Foliage tends to scorch and generally depreciate in dry conditions. This is a taprooted tree that once established is very difficult to transplant.

Northern catalpa - *Catalpa speciosa*: average, medium to wet, well-drained soils in full sun to part shade. Tolerant of a wide range of soil conditions including both wet and dry soils. Tolerant of seasonal flooding. Prefers moist fertile loams.

Ginko – *Ginkgo biloba*: average, medium moisture soil in full sun. Prefers moist, sandy, well-drained soils. Tolerant of a wide range of soil conditions, including both alkaline and acidic soils and compacted soils. Also tolerant of saline conditions, air pollution and heat. Adapts well to most urban environments.

Honeylocust - *Gleditsia triacanthos*: organically rich, moist, well-drained soils in full sun. Tolerant of a wide range of soils. Also tolerant of wind, high summer heat, drought and saline conditions.

Sycamore – *Platanus occidentalis*: average, medium to wet, well-drained soils in full sun. Tolerates light shade. Prefers rich, humusy, consistently moist soils. Generally tolerant of most urban pollutants.

Trees native to further south with characteristics predicting likely survival with limited testing
Black gum - *Nyssa sylvatica*: average, medium to wet soils in full sun to part shade. Prefers moist, acidic soils. Tolerates poorly-drained soils and can grow in standing water. On the other end of the spectrum, tolerates some drought and adapts to some dryish soils, at least in the wild. Long taproot precludes moving established trees. Female trees need a male pollinator to set fruit.

Hickory, mockernut- *Carya tomentosa*: humusy, rich, medium moisture, well-drained soils in full sun to part shade. Best performance occurs in moist soils. Plants are generally intolerant of shade. This tree needs a large space within which to grow. It may be difficult to transplant because of its long taproot.

Hickory, pignut – *Carya glabra*: humusy, rich, medium moisture, well-drained soils in full sun to part shade. Best performance occurs in moist soils. Plants are generally intolerant of shade. This tree needs a large space within which to grow. It may be difficult to transplant because of its long taproot.

Hickory, shellbark - *Carya laciniosa*: humusy, rich, medium to wet soils in full sun to part shade. This tree needs a very large space within which to grow. In the wild, it grows in areas that are periodically flooded. It is difficult to transplant because of its deep taproot. Cross-pollination generally produces a more abundant crop of better quality nuts.

Pecan - *Carya illinoensis*: humusy, rich, moist, well-drained soils in full sun. Difficult to transplant because of its deep taproot. If grown for nut production, plant at least two different varieties for best cross-pollination. Nut production can be sparse in the northern part of its growing range, particularly when spring is late and summer is cool. May be grown from seed, but it normally takes 8-10 years for a young tree to bear a nut crop.

Oak, chinkapin or yellow – *Quercus muhlenbergii* (as close as S WI and SE MN): average, medium, well-drained soils in full sun. Although it primarily grows in dry, rocky soils in the wild, it seems to prefer moist fertile loams in cultivation. Relatively good drought tolerance. May take up to 30 years for this tree to bear a first crop of acorns.

Oak, post – *Quercus stellata*: dry, sandy to rocky soils. Also, however, it is found growing in moist soils of flood plains along streams.

Oak, scarlet – *Quercus coccinea* (nice stand as close as Madison): average, dry to medium, well-drained soil in full sun. Prefers dry, acidic, sandy soils.

Oak, shingle – *Quercus imbricaria*: rich, humusy, medium moisture, well-drained soils in full sun. Adapts to a wide range of soils including dry ones.

Oak, southern pin oak – *Quercus palustris*: average, medium to wet, acidic soils in full sun. Prefers moist loams. Tolerates poorly drained soils. Tolerates some flooding. May take up to 15-20 years for this tree to bear a first crop of acorns.

Sassafras - *Sassafras albidum*: average, medium, well-drained soil in full sun to part shade. Prefers moist, acidic, loamy soils. Tolerates dry, sandy soils. Large taproot makes transplanting of established trees difficult. If root suckers are not removed, tree will spread and begin to take on the appearance of a large multi-stemmed shrub.

Tulip poplar - *Liriodendron tulipifera*: moist, organically rich, well-drained loams in full sun. Tolerates part shade. Trunks of mature trees may reach 4-6' in diameter, usually rising column-like with an absence of lower branching. It is named and noted for its cup-shaped, tulip-like flowers that bloom in spring.