Adaptive Silviculture for Climate Change in Mississippi National River and Recreation Area, an Urban National Park

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Silviculture includes planting and maintaining trees to ensure healthy forests.
MNRRA: An Urban National Park

• 500,000 estimated ash trees being lost in urban natural areas in park

• Managers need information on how to handle this impact alongside changing climate
  ○ What do we plant instead?

• Opportunity for outreach and education to large, proximal, and engaged community
Adaptive Silviculture for Climate Change

Key elements:
- Tests alternative adaptation strategies
- Science-manager partnership
- Co-development of treatments
- Replicated design
- Incorporates silvicultural techniques
- Operational scale*

Manage for Persistence:
Ecosystems are still recognizable as being the same system (character)

Manage for Change:
Ecosystems have fundamentally changed to something different

Resistance
Resilience
Transition (Response)
Stakeholder Workshop

- 30+ attendees that manage or do research along the Mississippi in the area
- Worked to collaboratively develop 3 treatments
Adaptive Silviculture for Climate Change:
Experimental Design

57 trees per plot × 3 treatments × 2 replicates/block × 3 blocks = ~1000 trees
Data Collection

● 25 1/10th acre plots sampled in fall of 2019
  ○ Forest inventory data collected - height, diameter, species, status (live or dead)
● Highlights of what we observed
  ○ 380 tree sampled - 278 (73%) were dead
  ○ 252 were dead ash (only 2 live ash observed)
  ○ Elm (50) and boxelder (31) most common live trees but small average diameter 7.7 in. for elm and 11.5 in. for boxelder
Monitoring Plan

- Measuring seedling basal diameter, height, and status (live or dead) intensively for the next two years
  - When are seedlings dying during the growing season?
  - Which species are winners in the short term?
- Measure canopy light conditions
- Measure tree physiology
  - How does photosynthetic capacity vary among seedlings?
- Opportunities for other disciplines and variables to be measured
Adaptive Silviculture for Climate Change: Timeline

- **Summer 2019:** Baseline Monitoring and Plot ID
- **Spring/summer 2020:** Plot prep (fence building), Trees in gravel beds
- **Fall 2020:** on-going monitoring
- **Fall/Winter 2019-2020:** small diameter tree removals; order trees
- **Fall 2020:** planting
Key Results

- Initial baseline monitoring completed
- Implementation set to begin in winter/spring of 2019
- Expected outcomes:
  - Some preliminary results will be available as early as 2021, these can help inform management actions by other partners working along the river
  - Published results will feed into larger ASCC data set and inform folks nation wide
  - Outreach and engagement will connect local community to climate change adaptation work
Future Challenges and Next Steps

- Timing of planting...flooding
- Size of stock, sourcing, protection from herbivory
- Managing public opinion in a very popular, well-used space
- Measurements and data collection!
- Securing money for continued data collection and research
  - LCCMR - Minnesota tax money at work, help us show this is a priority
Want to put big pic of lost ash canopy here

Kissena Park, Queens, NY
Thank You!

Find more information at:

- parkconnection.org/ascc
- adaptivesilviculture.org/project-site/mississippi-national-river-and-recreation-area
- forestadaptation.org/adapt/demonstration-projects/MNRRA_ASCC
1. Zone 4 Silver maple (Acer saccharinum)
2. American elm (Ulmus americana)
3. Cottonwood (Populus deltoides)
4. Hackberry (Celtis occidentalis)
5. River birch (Betula nigra)
6. Swamp white oak (Quercus bicolor)

1. Zone 5 Silver maple (Acer saccharinum)
2. Zone 4 Silver maple (Acer saccharinum)
3. American elm (Ulmus americana)
4. Cottonwood (Populus deltoides)
5. Black willow (Salix nigra)
6. River birch (Betula nigra)
7. Bur oak (Quercus macrocarpa)
8. American sycamore (Platanus occidentalis)
9. Swamp white oak (Quercus bicolor)

1. Zone 6 Silver maple (Acer saccharinum)
2. Zone 4 Silver maple (Acer saccharinum)
3. Red maple (Acer rubrum)
4. American sycamore (Platanus occidentalis)
5. River birch (Betula nigra)
6. Sweetgum (Liquidambar styraciflua)
7. Southern pin oak (Quercus palustris)
8. Honey locust (Gleditsia triacanthos)
9. Yellow poplar (Liriodendron tulipifera)
Adaptive Silviculture for Climate Change!
In the United States, natural areas make up 84% of urban parkland.

Four out of five Americans live in cities throughout the country.