

ONLINE COURSE

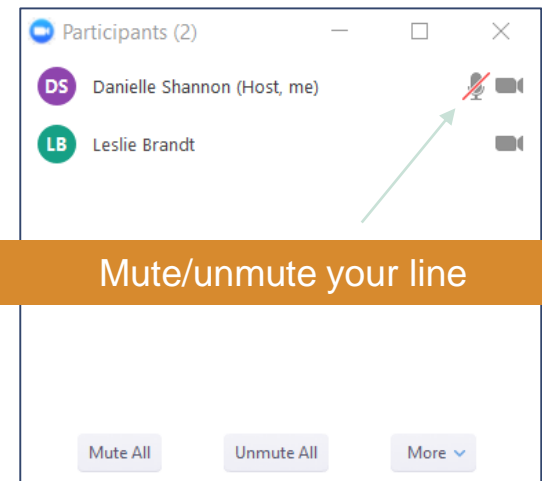
# URBAN FORESTED WATERSHEDS ADAPTATION PLANNING AND PRACTICES

## Session 7: Sharing your Story and Close-out

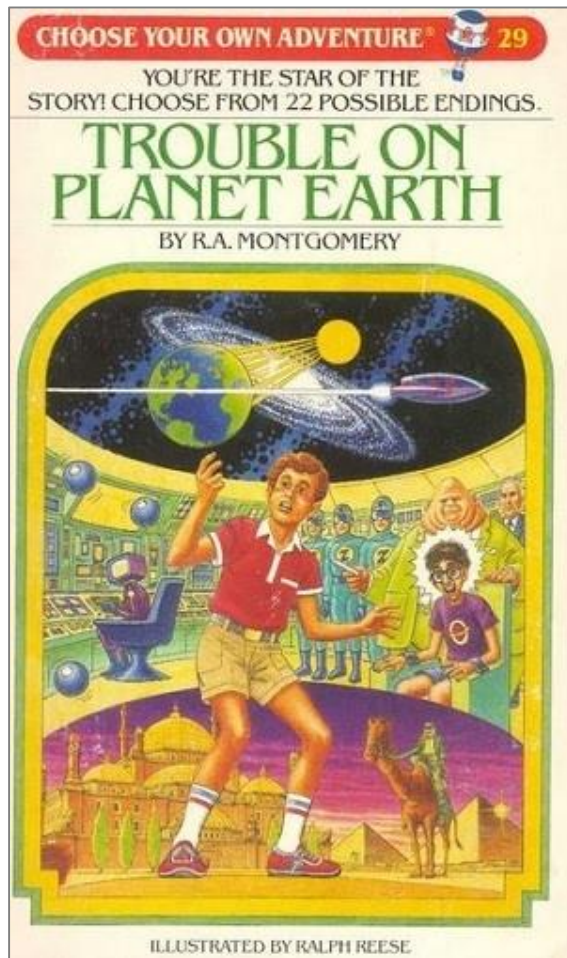
Tuesday, December 18, 2018 @ 11 am ET

### Web session etiquette. Please:

- If you are using a phone, turn off your computer speakers to avoid feedback and terrible noises.
- Mute your line unless you are speaking to the group.



# Today's Agenda



## QUICK Review

- Adaptation Workbook cycle
- Tying it all together: elements of a good “adaptation story”

## Tell us your Adaptation Story!

- Report out using template slides you completed as this week's assignment
- Discussion

## Next Steps & Closing Items

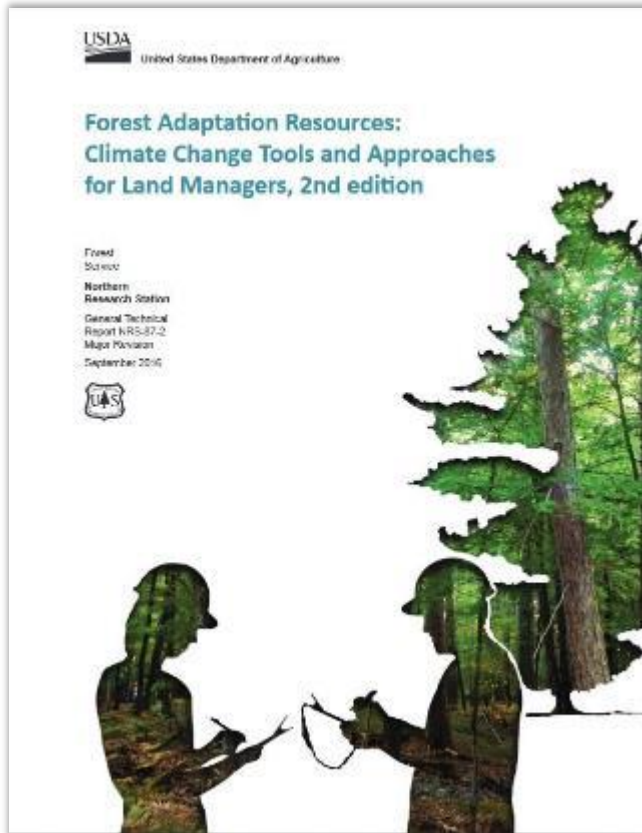
- Adaptation Demonstrations
- CEUs

# Course Objectives

Integrate climate change considerations into real-world projects for forest management and conservation

- ✓ Identify local climate change impacts, challenges, and opportunities
- ✓ Develop specific actions to adapt to changing conditions
- ✓ Create your own “climate-informed” projects
- ✓ Better communicate with stakeholders
- ✓ Plus: Access post-training support from NIACS staff during project planning and implementation

# Forest Adaptation Resources



Swanston et al. 2016;  
[www.nrs.fs.fed.us/pubs/52760](http://www.nrs.fs.fed.us/pubs/52760)

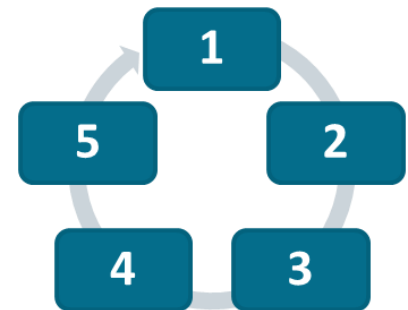
## Strategies & Approaches

Menu of adaptation actions



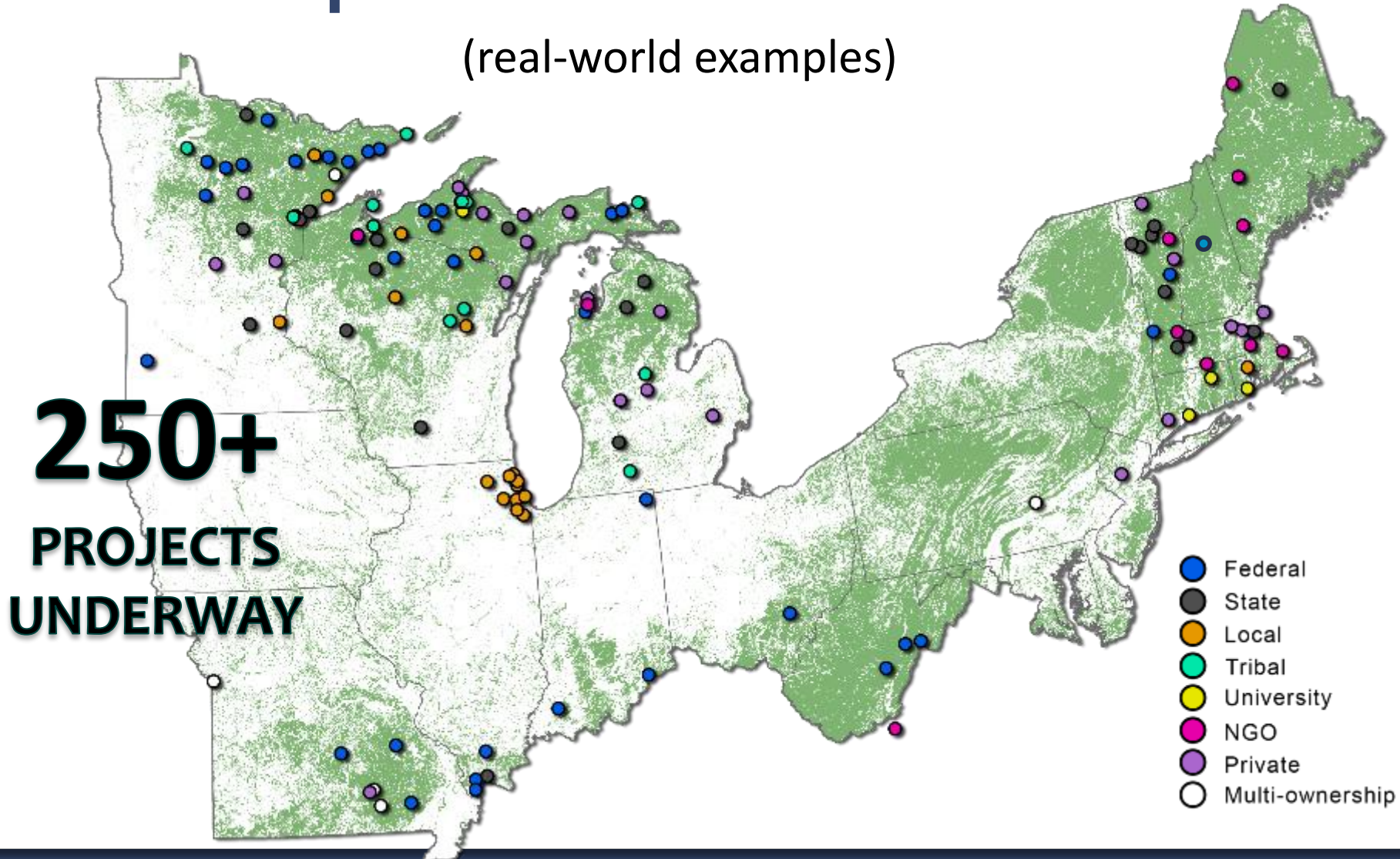
## Adaptation Workbook

- Structured process to integrate climate change considerations into management
- Workbook approach



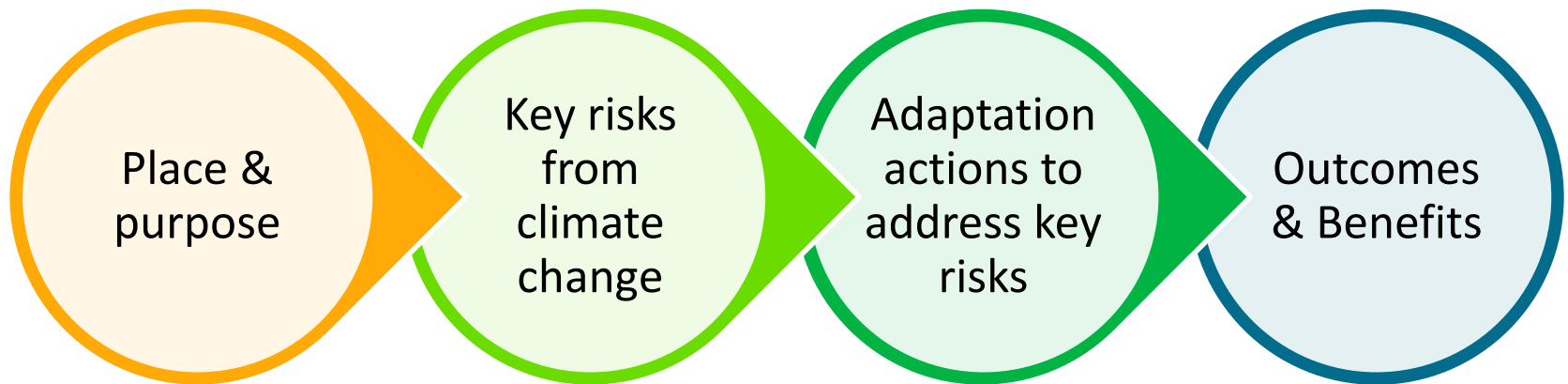
# Adaptation Demonstrations

(real-world examples)



[www.forestadaptation.org/demos](http://www.forestadaptation.org/demos)

# Example storyline



***Feel familiar?***

***You've already done all of this thinking!***

# Share Your Story – 5 min per group

- Audience
- Project: Place & Purpose
- Climate Change Challenges, & Opportunities
- Adaptation Actions
- Outcomes

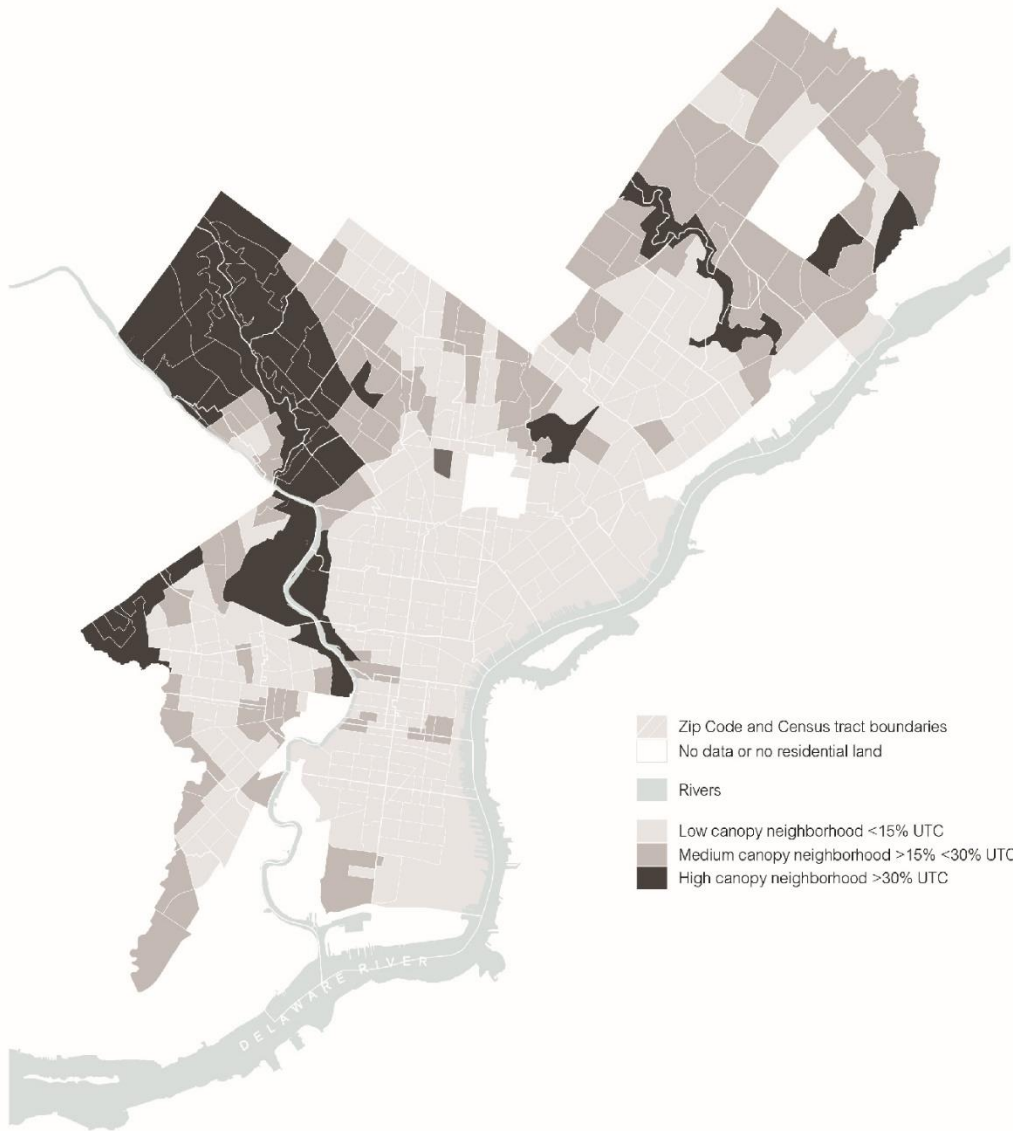


**5 minutes!**

# Order of Presentations

1. TreePhilly, Philadelphia, PA
2. Kensington Metropark, Milford/Brighton, MI
3. Chandler Park, Detroit, MI
4. Urban Forest Patch Connectivity, Bloomington, IN
5. Urban Forest Master Plan, Kansas City, MO
6. Urban Forestry Plan, Hot Spring, AR
7. Urban Forest Master Plan, Marine on St. Croix, MN
8. Horticulture Education Center Lot, La Crosse, WI
9. Coastal Habitat Restoration Project, Racine, WI
10. Golf Mill Park, Niles, IL

TreePhilly



Management Area: Project Area by Canopy Type (Data from 2011)

#### About TreePhilly

We are a program of Philadelphia Parks and Recreation and a public private partnership. We have given away 22,000 trees to Philly residents to plant on private property since 2011. With a renewed sponsorship for the next three years which includes Jack's full-time employment, we ask, what can we do about climate change in the next three years?

#### 2011 - 2018

22,000+ trees  
 57 different tree species  
 40.9% small trees / 35.5% fruit trees / 7.5% Medium trees / 16.1% Large trees  
 Most distributed species: 7.7% *Cercis canadensis*

#### Philly Urban Forest Composition (Nowak et al 2015, 13)

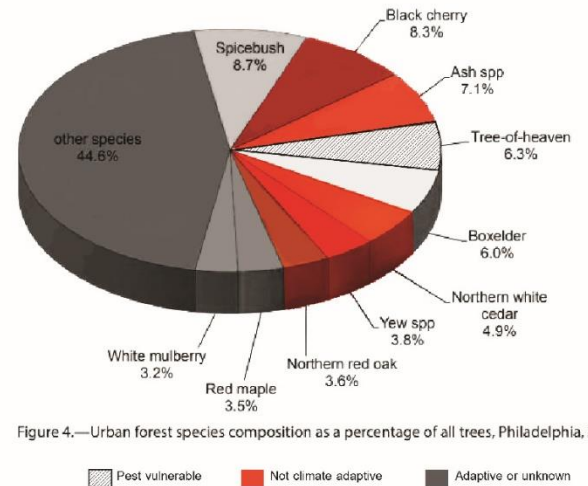
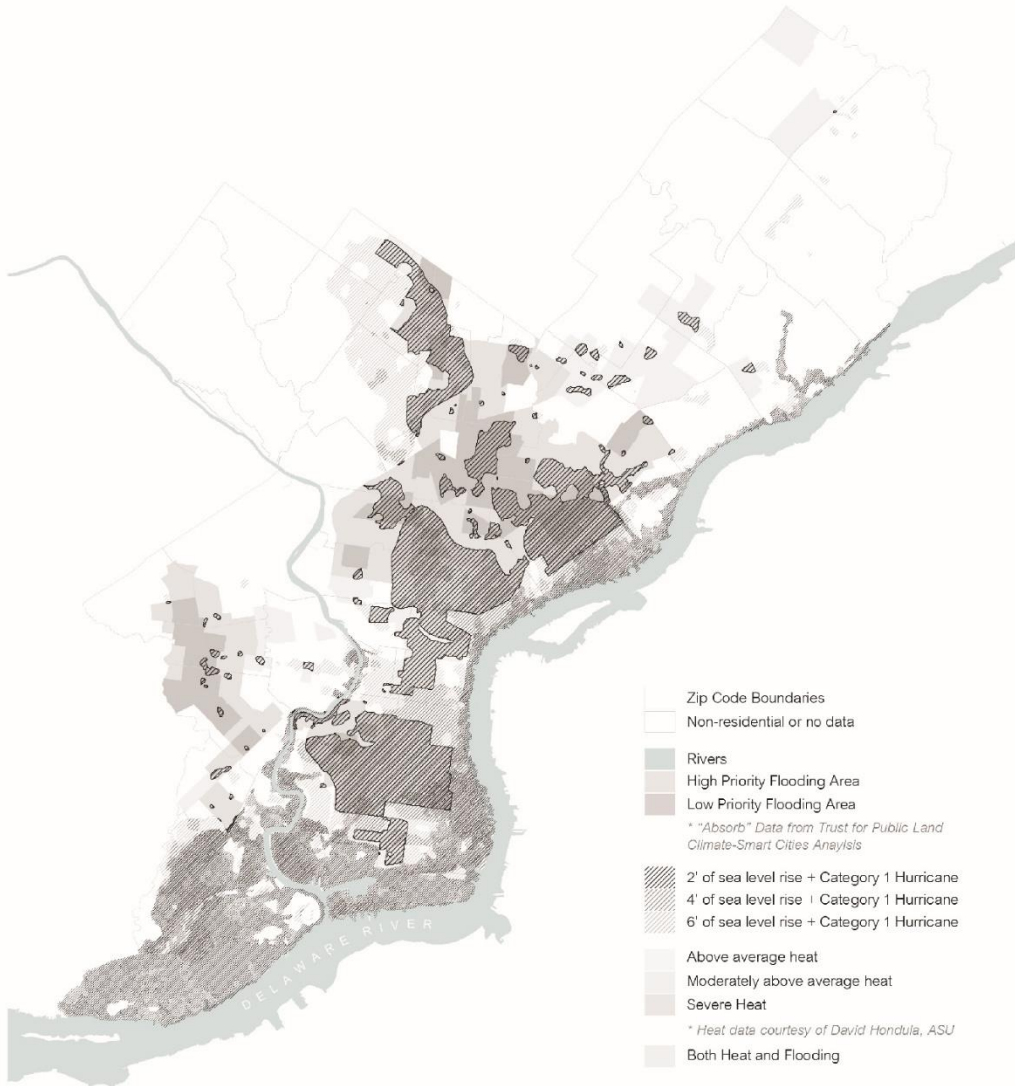


Figure 4.—Urban forest species composition as a percentage of all trees, Philadelphia, 2012.



Present Heat and Precipitation Affects

## Climate Impacts in Philadelphia

### + HEAT

2.2 F to 7.6 F increase  
 17 to 52 days >95 F by 2100  
 2 to 16 days >100 F by 2100

High summer heat and heat inequity already deeply impact Philadelphia neighborhoods. In climate change, heat will become worse with greatest warming in summer and fall.

### Ecological Impacts

- Increased heat stress on vegetation
  - increased sapling mortality
- + Longer growing season by 21 days or more
- / Changing hardiness zone to Zone 9
- frost-limited disease and pests will increase range

### Human Impacts

- Increased heat inequity
- Increased health problems and lowered life expectancy
- Death
- Increased energy bills
- Increased school closures

### + PRECIPITATION

#### Increased annual

High summer heat and heat inequity already deeply impact Philadelphia neighborhoods. In climate change, heat will become worse with greatest warming in summer and fall.

- Intense precipitation events will increase in frequency
- + Increased precipitation will improve vegetation growth rates
- Increased riverine flooding along the Schuylkill and Delaware

- Intense flooding from both rivers will impact transportation corridors
- Already stressed sewer system will become more taxed flooding neighborhoods

### + EXTREME WEATHER

#### New and extreme patterns

Our weather patterns will change with increased frequency and intensity of storms and seasonal drought. Winter as we know it will disappear.

- Increased seasonal drought
  - drier soil in later growing season
  - increased sapling mortality
- Less snow, reduced cover and depth
- Late frosts
- Vegetation will be stressed at every extreme (cold, heat, drought)

- Increased costs of repairing property damage from storms
- + Fewer Code Blues
- + Decreased heating costs
- Psychological and cultural loss of losing winter season

### + SEA LEVEL RISE

#### 1 to 5 feet by 2100

Sea level rise will affect the Delaware River, increasing water height and salt line. Storm surge from increased intense and frequent storms will worsen the rising waters.

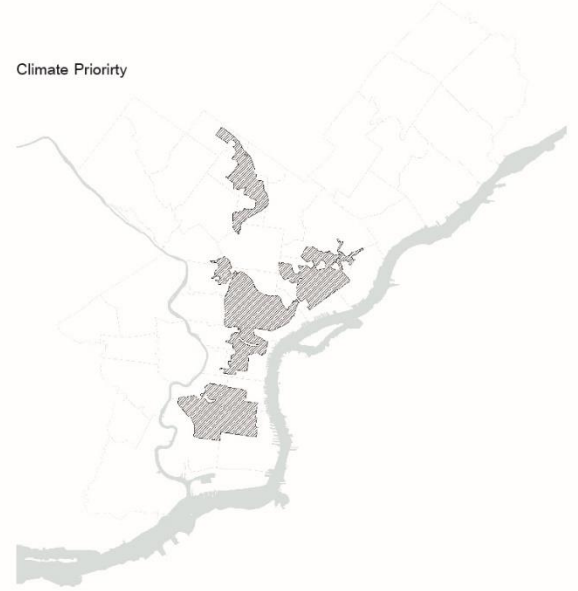
- Salt deposits after flood waters recede
- Vegetated areas inundated. Rising marshlands habitats will overtake low-lying forests.
- Potential salinization of water table

- Airport, Oil Refinery, Navy Yard, and Eastwick neighborhood will be affected by SLR and storm surge with future storms

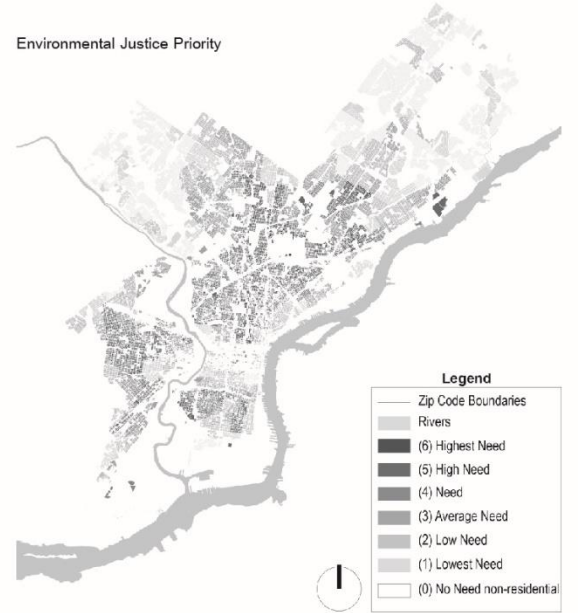
Climate Priority Areas + Environmental Justice Priority Areas



Climate Priority



Environmental Justice Priority



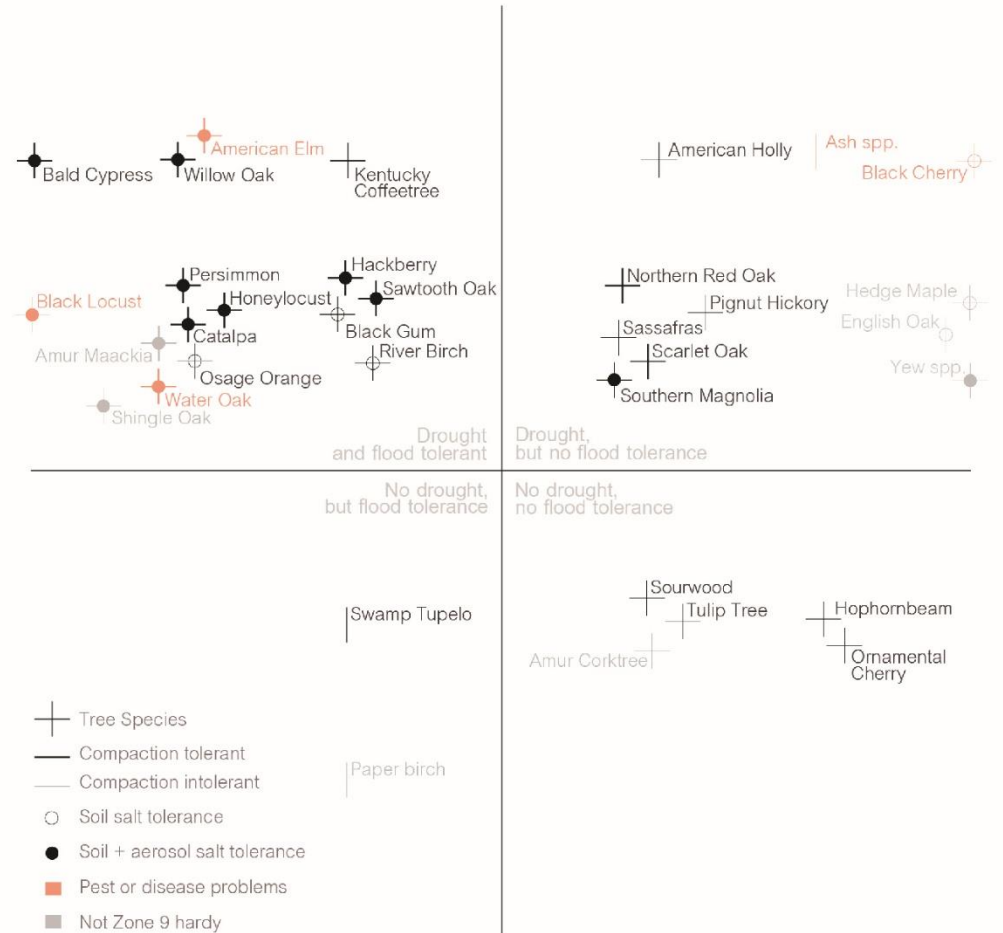
Top 8



Implementation and Monitoring Tactics

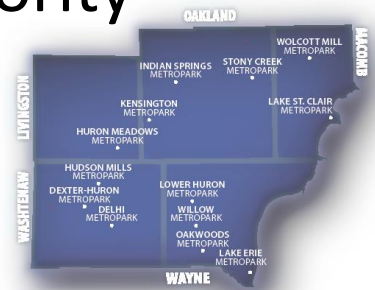
New Species Palettes	Investigate Provenance	Grow New Species	Tailor Species Palettes
Monitor Survivability	Target Climate Priority Area	Collect Local Knowledge	Enhance Care Curriculum

Tree Species Index



# *Kensington Metropark Oak/Hickory Forest Management*

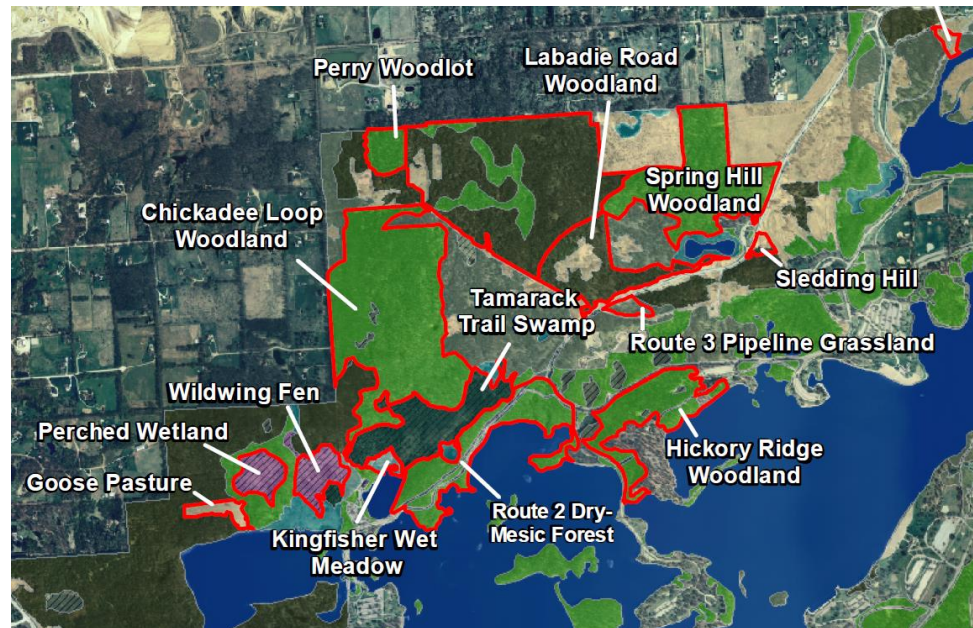
- Ryan J. Colliton, Chief of Natural Resources and Regulatory Compliance
- Huron-Clinton Metropolitan Authority
- Milford/Brighton Michigan



# Kensington Metropark

**Target Audience:** *Patrons, Board of Commissioners, Executive Leadership*

- Kensington Metropark
- 4,500 acres
- Restore oak/hickory forest types
- Many remnants of these forest types
- No active management until 2006



# *Climate Change Opportunities*

- Prefer to look at things in terms of opportunities, motivation for stakeholders to act NOW!
- Funding and focus on invasive species
- Drier warmer climate will likely promote dominant ecosystems
- More opportunity to conduct effective fires
- Fortunate enough to have the resources (staff, funding, time?) to act now while we still can and leadership support
- Conservation of habitats and species that are in decline

# *Adaptation Tactics*

- Needs more work (PFAS)
- Invasive species control
- Re-introduction of hist. dist.
- Long-term planning
- Landscape scale management
- Adaptive management



# Key Outcomes

- Site inventory of all habitats dominated by oaks
- Determine feasibility
- Develop priority list for habitat restoration
- Implementation of plan in 25% of habitats by 2022
- Monitoring and adaptive management implementation
- Connect people to their Natural Heritage



# Chandler Park: Revitalization of a Historic Urban Park in Detroit

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Susan Rusinowski, Abby Kleinheksel

Environmental Consulting &  
Technology, Inc. (ECT)

Detroit, Michigan



CHANDLER PARK  
CONSERVANCY

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D E T R O I T

# Chandler Park, Detroit, Michigan

The vision for this park on Detroit's east side is a revitalized multi-facility recreation, conservation, and education campus on 200 acres, which, when completed, will be the first of its kind in Michigan.

## Management Goals:

1. Increase tree canopy
2. Improve wildlife habitat
3. Reduce flooding on site
4. Capture, treat, and retain stormwater and improve water quality

The first phase of the project is to implement a 2 acre wetland, rain garden and bioswale in the park, as well as plantings for all, 100 upland trees, and wildlife habitat structures.



# Climate Change Challenges & Opportunities

## Challenges:

- More frequent and heavier rain events.
- Inconsistent wetland water levels.
- Tree/plant suitability and habitat/wildlife survivability.

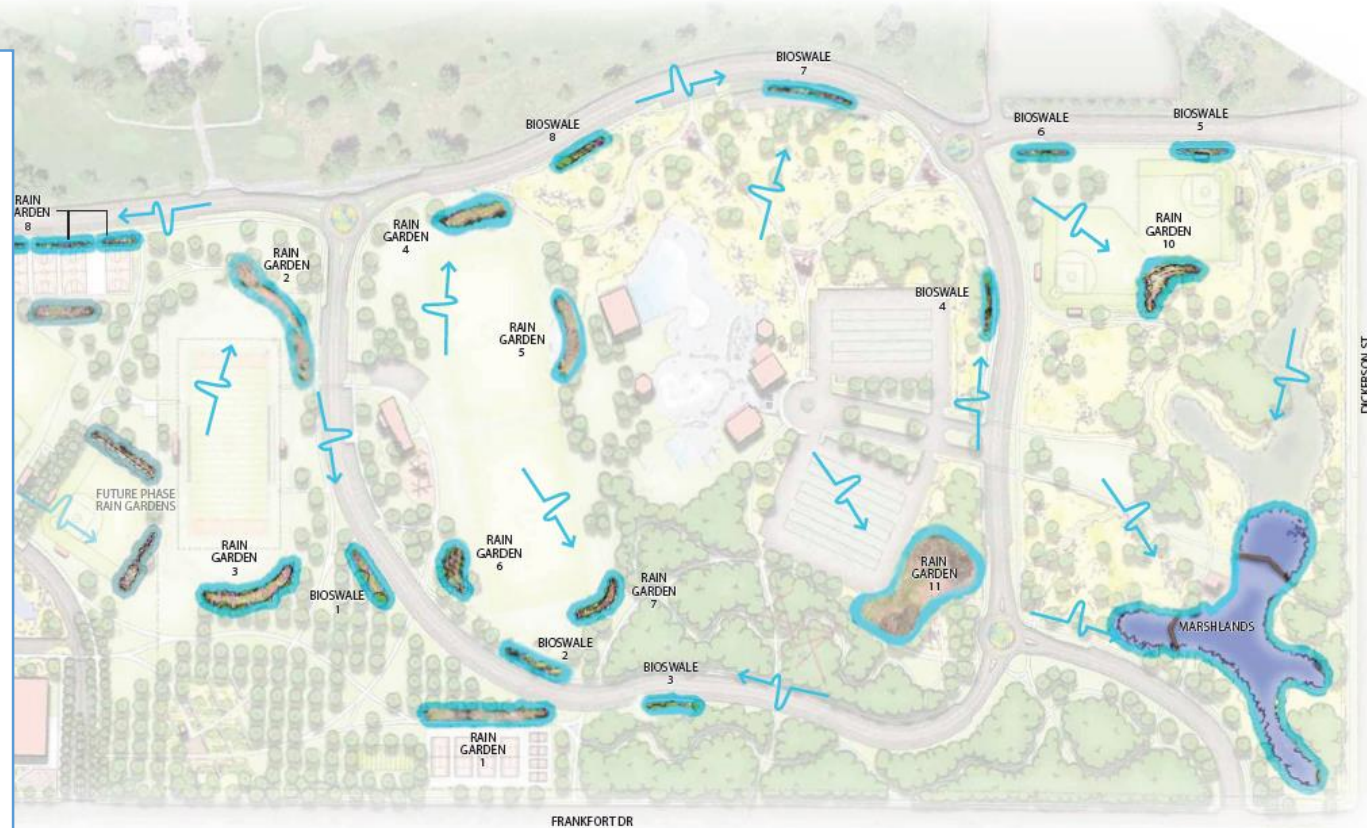
## Opportunities:

- Longer growing season for well maintained, native and resilient plants.
- Fewer days with freezing temperatures.



# Adaptation actions

- Use a conservative approach to stormwater modeling
- Add 4" topsoil (with high OM) or compost to all BMPs, add sediment forebay to wetland
- Choose diverse/resilient trees (in species, not age)
- Add habitat structures in wetland



## STORMWATER DETENTION AREAS

- Capacity to collect the first 24" of stormwater runoff from recreational facilities, roads, and parking lots
- Native plants filter contaminants out of stormwater and provide wildlife habitat
- Filtered, cleaner stormwater infiltrates slowly into the ground and replenishes groundwater
- Infiltrated stormwater is kept out of the combined sewer system, relieving stress on the combined sewer system

# Project Outcomes

## Outcomes

- Align climate change adaptations to the vision for Chandler Park
  - Plant/tree short and long-term resilience and survivability
- Reduce flooding in the park and reduce CSOs in Detroit

## Monitoring

- Pre and post-project monitoring for soil and water quality (funded)
- Ensure warranty period/maintenance from landscaping contractor for plants
- All maintenance performed by Parks Dept. – work together through maintenance documents and training

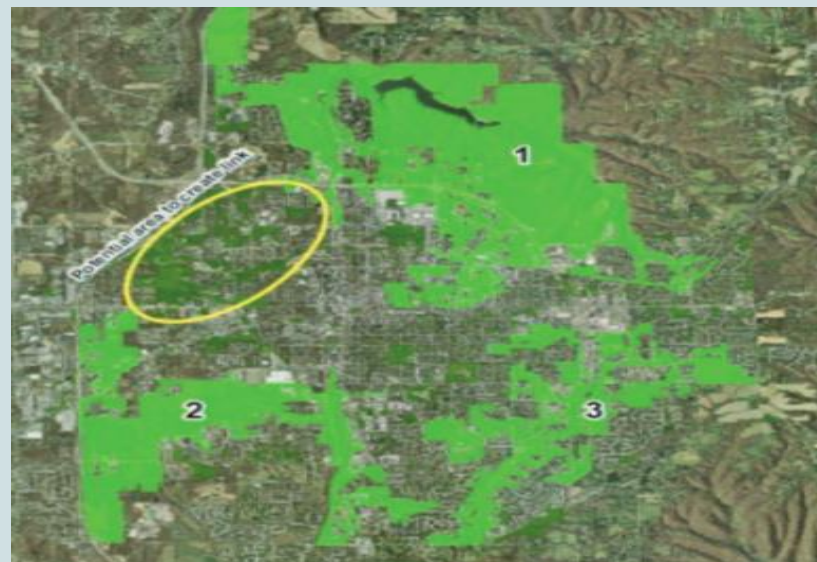
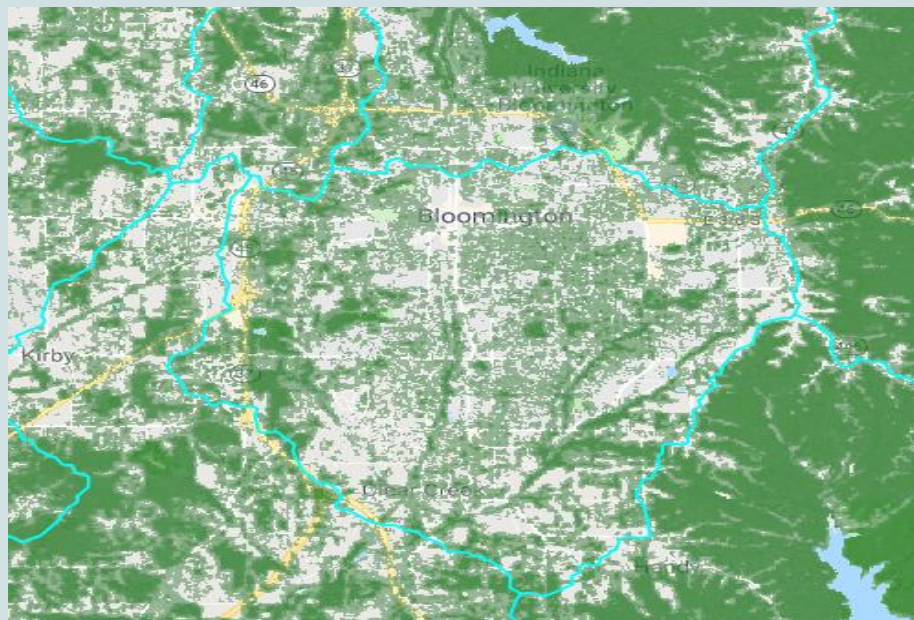


# Forested Watersheds and Urban Forest Patch Connectivity in Bloomington, IN

Stephanie Freeman-Day and Burney Fischer  
School of Public and Environmental Affairs  
Indiana University

# Bloomington Indiana Urban Forest Connectivity

- **New Sustainability Action Plan features an afforestation project connecting two area watersheds**
- **An opportunity to create an Urban Forest Corridor adaptable to local climate change impacts**



- **Use data from i-tree and detailed information from city inventory to assess current canopy cover and tree diversity of project area**
- **Develop resources and goals including a list of recommended tree species and canopy cover recommendations**

# Climate Change Impacts and Opportunities in Southern Indiana

## Impacts:

- **Temperatures during all seasons are expected to rise between 2° and 7°F by the end of the century.**
- **Precipitation patterns are expected to change, with heavier winter and spring precipitation and dry periods, including drought, are projected for summer and fall.**
- **Storms will continue to be more frequent and intense, causing flooding and structure damage.**

Brandt et al. 2014. Central Hardwoods Ecosystem Vulnerability Assessment and Synthesis. USDA Forest Service Northern Forest Research Station.



## Opportunities:

- **We can expand southern plantings into our region.**
- **A connected Urban Forest will reduce impacts from heavy rains, retain water during dry periods, and reduce Urban Heat Island**

# Adaptation Actions

## Adaptation Tactics

- Reduce forest fragmentation
- Maintain and create habitat corridors through reforestation and restoration
- Favor or restore native species expected to be adapted to future conditions and are more storm-resistant
- Establish or encourage new mixes of native and non-invasive species
- Select tree species to match current and future site conditions
- Include species and genotypes with wide moisture and temperature tolerances



# Objectives and Monitoring

## Objectives:

- A healthy corridor of urban forest patches between outlying forests and watersheds
- Increase canopy cover of project area from 16% to 25% over 10-year period with further future increases
- Diverse plantings including natives to this area and natives to further south in Indiana, Kentucky, Missouri- move away from highly dominant maples



## Monitoring:

- Annual survival rate of plantings (goal 93% plus, Widney et al.)
- Tree diversity of project area
- Canopy cover change over time
- Partner with Indiana University and Citizens' Science groups to conduct monitoring

# Kansas City Urban Forest Master Plan

Presented by

Wendy Sangster and Stephen Van Rhein

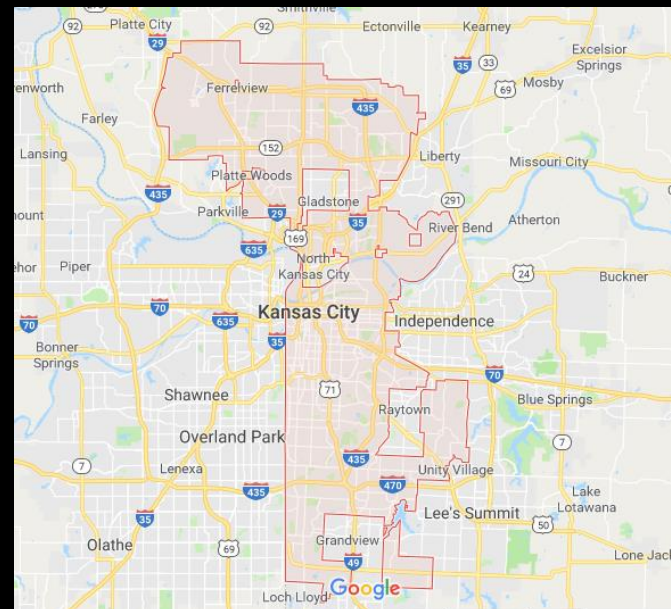
Missouri Department of Conservation

To the **City Council of Kansas City, MO**

# Kansas City, MO

## KC Urban Forest Master Plan Primary Goal:

To manage Kansas City's urban forest to maximize its environmental benefits to the community and improve the quality of life for Kansas City residents by providing an aesthetically pleasing urban forest that improves public health, enhances social cohesion, and provides economic value to the city.



# Adaptation Actions

## Adaptation Tactics

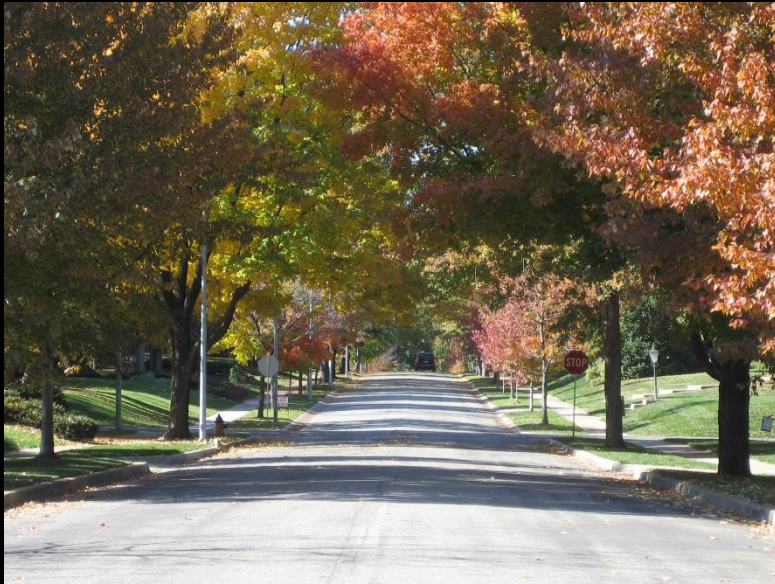
Promote diversity across taxonomic levels, no more than 5% of any family, 10% of any genus, and 15% of any species.

Develop an invasive species management plan for all parkland.

Establish diverse trees and shrubs in riparian areas deficient in proper cover.



# Outcomes



**By using these tactics we hope to create an urban forest that is more resilient to climate change so that your community continues to realize the benefits of a healthy urban forest.**



To measure our progress we will track:

- Percent forest canopy
- Species diversity
- Prevalence of invasive species

A stylized, colorful illustration of a landscape. The foreground features rolling green hills in various shades of green, with a dark brown path winding through them. On the left, there are three trees: a tall green one, a purple one, and an orange one. A small red bird is flying in the sky above the trees. The background consists of light blue and white wavy bands representing a sky or water.

# Hot Springs Urban Forestry Plan

*Regine Skelton – Garland County Forester  
Arkansas Forestry Commission*

# Hot Springs, Arkansas

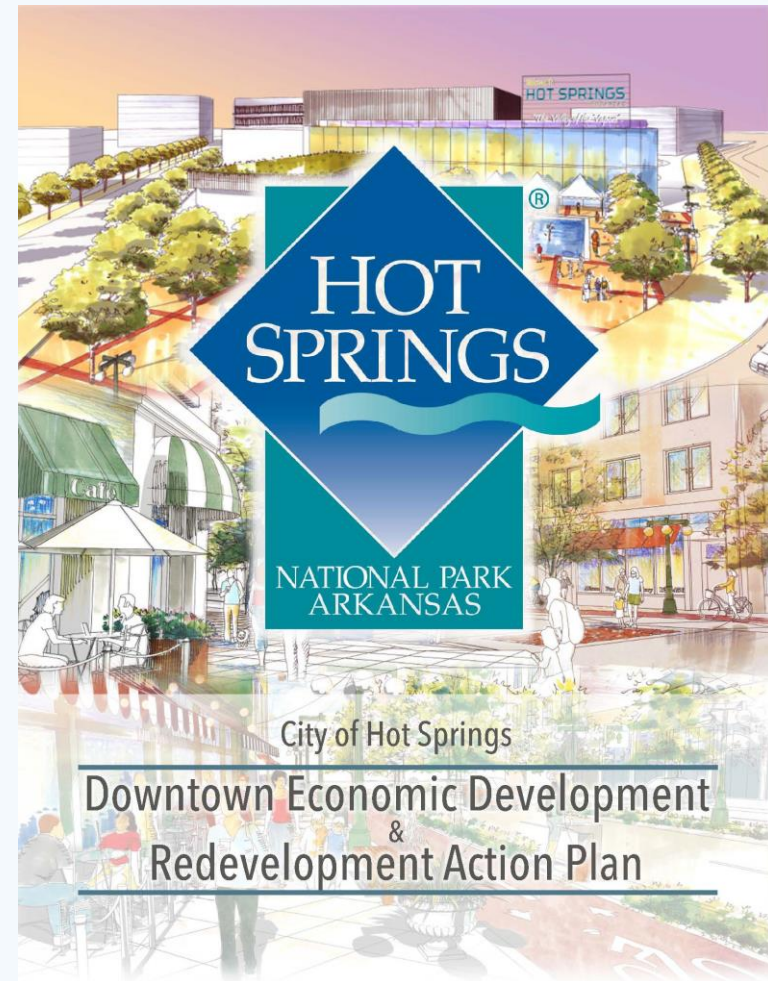
- *Population: 30,000 with additional 10,000 in satellite cities*
- *Worldwide Tourist Destination*
  - *Horse Races*
  - *Bath-houses*
  - *Outdoor Recreation – Fishing, Hunting, Boating, Hiking, Biking, etc*
- *City surrounded by steep terrain mountains and National Parklands.*
- *Several very large lakes surrounding the city with large and aging dams.*



# Hot Springs Upgrades

- Improve downtown for walkability and bicycle safety
  - Remove select street parking for increased sidewalk space
  - Protected & dedicated bicycle lane
- Increase green infrastructure in frequently flooded areas
  - Tree Plantings
  - Rain Gardens
- Daylight streams
  - David Watkins Park – Daylighting Hot Springs Creek

[https://www.youtube.com/watch?v=bH\\_HP28fJcQ&feature=youtu.be](https://www.youtube.com/watch?v=bH_HP28fJcQ&feature=youtu.be)



## Area Climate Change Projection

- *Arkansas projected to increase winter precipitation*
- *Arkansas projected to increase summer temperatures*



# Hot Springs Adaption

- *Increased Winter Precipitation*
  - *Preserve the Hot Springs “Critical Recharge Area”*
  - *Improve water infiltration in flooding areas with green infrastructure*
  - *Daylight stream where feasible to improve water conveyance*
- *Increased Summer Heat*
  - *Increase forest canopy to improve shade*
  - *Shift plant species used by Master Gardeners to be more drought hardy*
  - *Remove invasive species to improve resource availability to preferred trees.*

# Projected Outcomes

- *Increased Winter Precipitation*
  - *Critical Recharge Area – Preserve via USFS Forest Legacy funds, AFC to purchase forests to prevent development in critical areas.*
  - *Improve Infiltration – monitor the proliferation of rain gardens*
  - *Daylight stream – monitor percentage of stream in covered tunnel*
- *Increased Summer Heat*
  - *Forest Canopy – Ensure canopy coverage document remains up-to-date*
  - *Plants used – Engage with Master Gardeners about their planting plans*
  - *Invasives – Monitor prevalence of privet and Kudzu thickets. Address proliferation of Bradford Pear and Mimosa trees along major bypass road.*

# Marine on St Croix Urban Forest Management Plan

Urban Forest Task Force  
City of Marine on St Croix  
Minnesota

National Champion Black Willow!



Would-be MN Champion  
Northern Catalpa



# Marine's Urban Forest

Target audiences: City Council & Citizens of MoSC

## Small rural town <1 hr. north of MSP:

- population ≈700
- Total area 4 mi<sup>2</sup>
- Eastern Boundary is Nat'l Wild and Scenic Riverway, WI on other shore
- One of the oldest (178 yrs.) towns in MN.

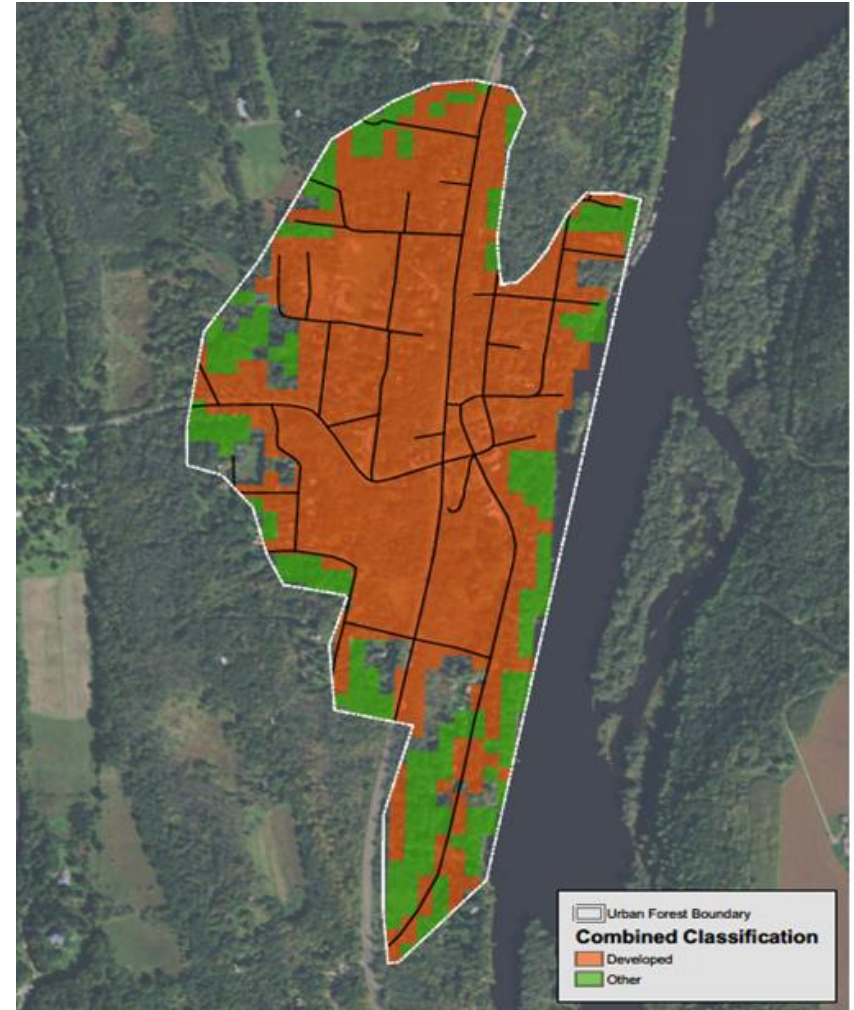
## MoSC's Urban Forest:

- 87 Acres (11%) of the entire town.
- 8.7 miles of public roads, City maintains a total of 14 miles of roadway.

## 2016 inventory (i-Tree Streets", 10 volunteers, >70 hrs.) revealed:

- 925 individual trees
- a cohort of large mature trees and a lack of younger age classes.
- 250 open/unoccupied planting sites.
- 100 ash (*Fraxinus* spp.)

***The question is which species to favor in planning plantings intended to renew our urban forest.***



# Change Impacts, Challenges, Opportunities

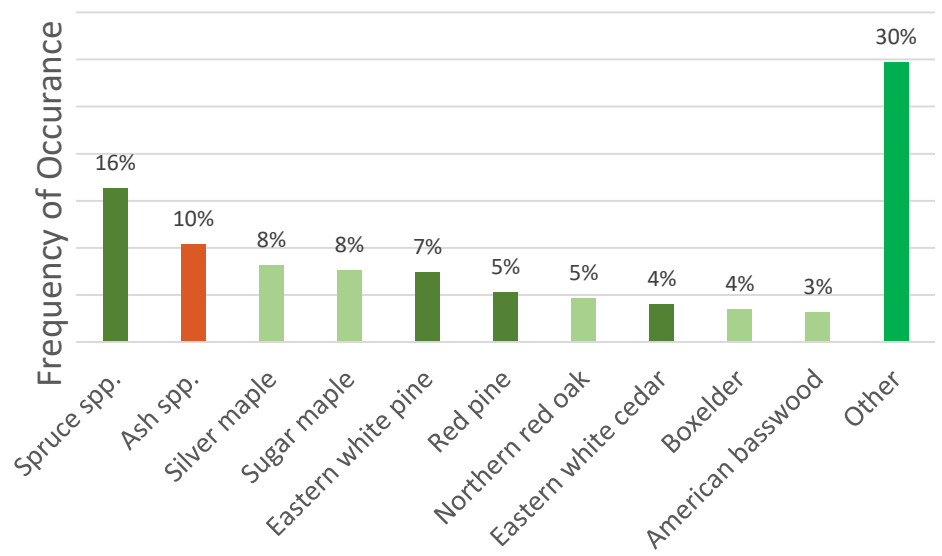
Warmer summers, longer periods between increasing severe precipitation events will likely reduce soil moisture:

- Northern conifers (1/3<sup>rd</sup>) are at south end of natural range
- Large cohort of veteran trees produce a disproportionate share of ecosystems services and may be more vulnerable to damage, increased risk of structural failures.
- It may be more difficult to successfully plant/recruit new trees.

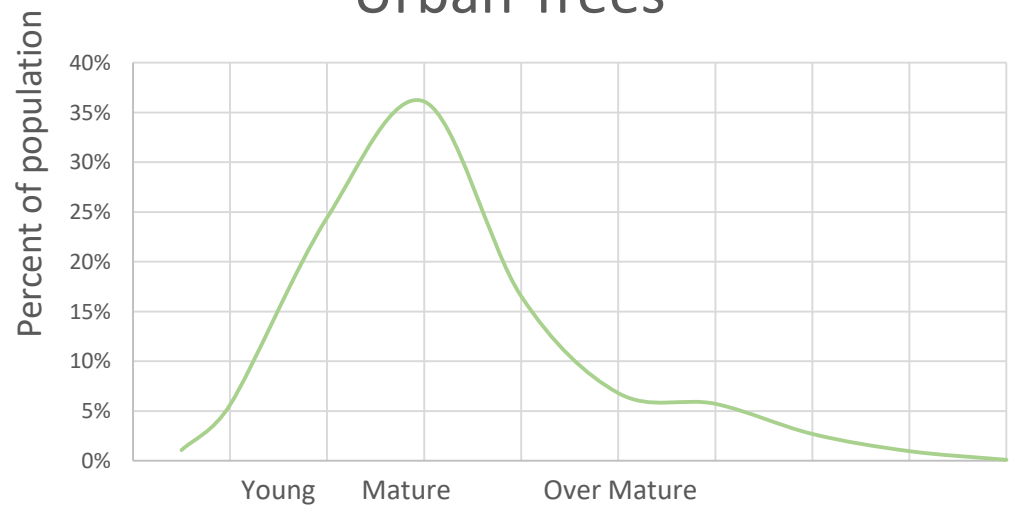
Opportunities to change species and age class diversity:

- 250 open planting sites
- 100 opening created by EAB
- Many more trees can be planted by private citizens, not included in current inventory

## Top Ten Species

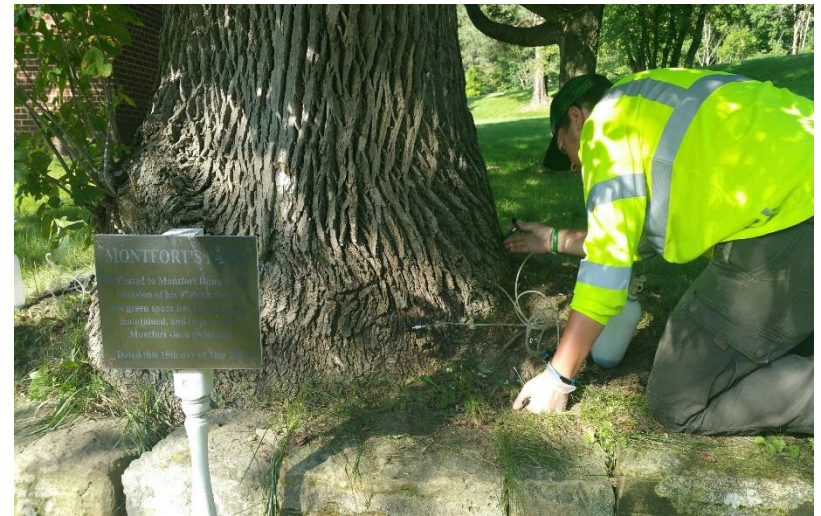


## Age Profile of Population of Urban Trees



# Adaptation Actions

- Identify “at risk” veteran trees, consider preventive maintenance care.
- Conduct ANSI A300 Part 9/ ISA BMP Tree Risk Assessment of trees in high use public green space.
- Identify preferred list of species and cultivars to favor in renewing MoSC’s urban forest.
- Develop community gravel bed, propagate, and plant 50 suitable trees each year.
- Partner with MoSC Restoration Society for project at Oaklawn Cemetery, inventory trees, consider this as a potential demonstration arboretum.
- Work with Christ Lutheran to establish savanna-like oak planting using UM CORPS concept.
- Consider expanding EAB treatment program on most significant ash in central green spaces.



Protecting significant Veteran Trees  
*The Montfort Ash*



Community Oak Restoration  
Planting System (CORPS)

# Outcomes

*2018 was a big year for Marine's urban forest. A new ordinance was enacted, and new Urban Forest Management Plan was drafted. We recently filed our application with Arbor Day Foundation for Tree City USA recognition!*



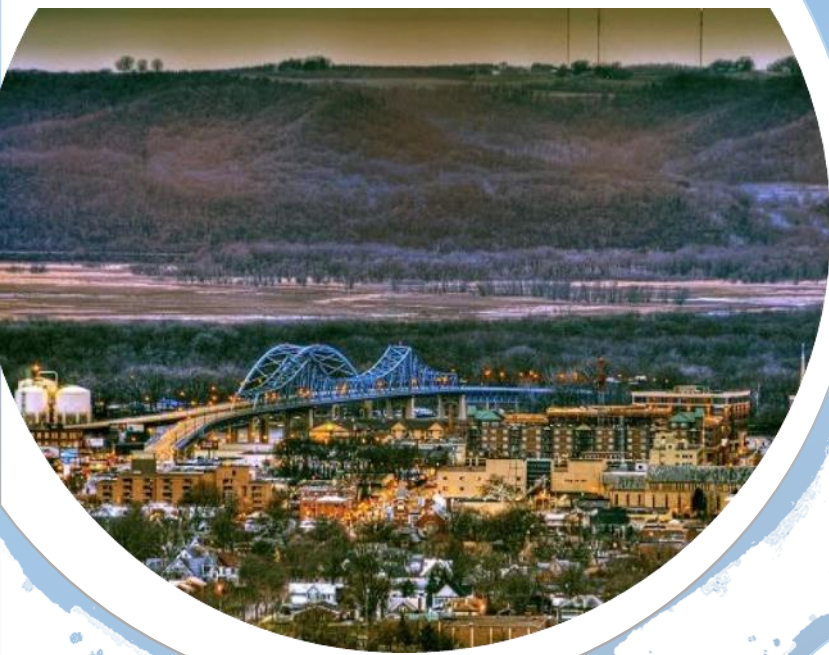
Outcome	Goal	Basis
Increase Ecosystem Services	\$150K (2016) to \$165K in 2021	Re-inventory MoSC's urban forest in 2021, and subsequent 5 yrs.
Increase canopy cover	X% 2021, 2026. The current level is unknown	Determine current level using USFS i-Tree tool.
Improved age class demographics in urban forest (trees!)	<3"dbh from 2% to 10%, <6" dbh from 5% to 7%	Re-inventory MoSC's urban forest in 2021. (Reset goal and re-inventory every 5 yrs.)
Increase species diversity in the urban forest	genus <15%, species <7.5% by 2021, then reset.	Re-inventory MoSC's urban forest in 2021. (Reset goal and re-inventory every 5 yrs.)

# Horticulture Education Center Lot

David Lein

Western Technical College - La Crosse, WI





Redevelop an urban space for the people of downtown La Crosse to interact with nature, learn about landscape resiliency, and provide examples people can replicate. Taking a ¼ Acre lot and having a regional impact!



**Western**  
**Technical College**  
THE ESSENTIAL EXPERIENCE

David Lein La Crosse, WI



How do we get temperate plant communities to survive in a desert like environment?

- Urban Heat Islands
- Stormwater Runoff
- Pollution





How do we get temperate plant communities to survive in a desert like environment?

Solutions?


Gravel Beds

Eco-turf

Rain Gardens

Education





# City of Racine Coastal Habitat Restoration and Water Quality Improvement

**Sheela Johnson**  
**U.S. Forest Service, State & Private Forestry**  
**Evanston, IL**

*Based on work from:*

*Julie Kinzelman, City of Racine Health Department*

*Matt Koepnick, City of Racine Forestry Department*

# Coastal Habitat Restoration and Water Quality Improvement

## City of Racine, Wisconsin:

Parks, Forestry, and Public Health & other departments are conducting a planning and restoration effort to improve coastal habitats, filter urban runoff, and provide recreational experiences on 80 acres of park land along Lake Michigan.

## Management Goals:

- Improve the quality of water flowing into Lake Michigan
- Increase native plant diversity in coastal wetland/dune & swale
- Provide high quality, connected habitats in a migratory bird flyway
- Provide sustainable recreation opportunities



# Climate Change Impacts, Challenges, Opportunities

## Climate Change Impacts or Opportunities

- Water levels in the Great Lakes have fluctuated over a range of three to six feet since the late 19th century... **Future changes in lake levels are uncertain.**
- **Heavy precipitation events** have been increasing and are projected to continue to increase further, which could increase runoff and local flooding.
- Higher air temperatures, increased evapotranspiration, anthropogenic water use, and possibly lower lake levels could **lower water tables** and increase the risk of drying of interdunal wetlands. This may favor *Phragmites* over native vegetation.
- By end of the century, **hardiness zones are expected to shift** from the current zone 5b to 6a - 7b, depending on the emissions scenario.

## Most Endangered Objectives:

- Diverse, native vegetation, particularly in wetlands and understory. *But some upland prairie and savanna species may have newly suitable habitat.*
- Functioning wetland acreage is at least 90% of the current value.
- Soil impacts from recreational use are limited to less than 10 percent of natural and semi-natural areas within the park.

# Adaptation actions

## Adaptation Tactics

- Wetlands/dune & swale: maintain rare ecosystems by “testing” many species using smaller planting stock.
- Upland/riparian: reforest developed areas by planting future-adapted species suited to prairie, savanna, forest & riparian habitats.
- Treat priority invasive species with emphasis on “defensible” sites.
- Identify locations to strategically increase riparian and upland buffer zones around the park.
- Monitor on-site erosion areas caused by concentrated water flows or human use, and retrofit infrastructure.

## What’s new?

- Deliberate choice of resistance in some ecosystems, transition in others
- Rather than treating invasives across property, consider current and future invasion pathways
- Increasing importance of buffering within and outside site; tools such as i-Tree hydro may target locations and species



# Outcomes

## Outcomes

- 90% of current restored wetland acreage is functioning wetland, with native vegetation
- Increased native tree cover adds 1 million gallons annual stormwater interception after 10 years
- Water quality supports full range of recreation (swimming)

## Measurement

- Wetland/vegetation mapping → transect/quadrat inventory
- Tree inventory and inspections
- Summer beach water quality monitoring, enhanced as feasible
- Super-crews: monitor and maintain grey and green infrastructure



Green flags and signs mean that water quality is good, and the beach is open for swimming.



Yellow flags and signs mean that water contains moderate bacteria levels. Swim at your own risk.



Red flags and signs mean that water quality is poor, and the beach is closed for swimming.

# Golf Mill Park

Todd Jackson

Village of Niles Public Work

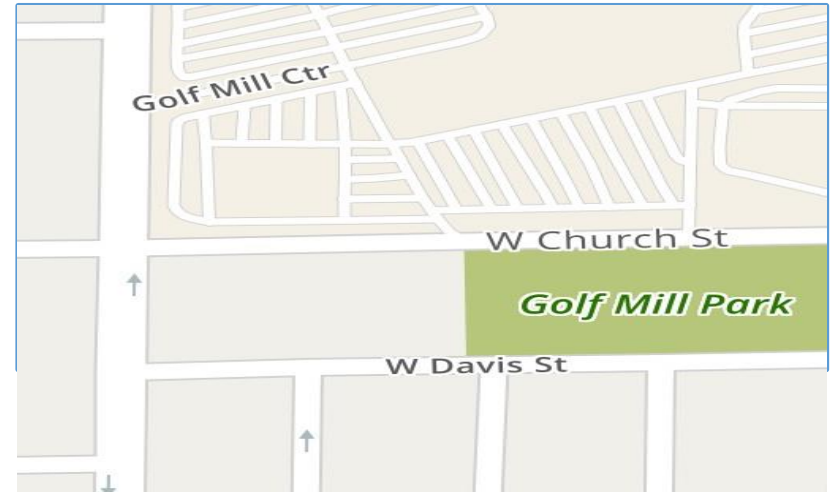
9101 Greenwood Niles, IL

# Template Slide #1 (Golf Mill Park)

Residents and Visitors of Niles

## **Project: Place & Purpose**

- The vision for this park is to incorporate a storm water retention basin that has the capabilities to host festivals and farmers market. The entire foot print of this location is undergoing a complete over haul. This location will be completely re landscaped with trees and flower beds.



# Template Slide #2: Climate Change Impacts, Challenges, Opportunities

## **Climate Change Impacts or Opportunities**

Since this project is still in the planning stages, we have the ability to address and plan accordingly to help ensure the sites success with proper tree selections. Our only concern is how much or how often will the retention basin will be filled with water which may impact the landscaping negatively and change the purpose for the park.

# Template Slide #3 Adaptation actions

## Adaptation Tactics

- Because this park is being used in a dynamic way, we will have to care for the trees in a way to combat possibly poor quality soil, soil compaction, drought, flooding at times and other natural factors. Properly mulched trees gypsum and other additives might be needed in the beginning for initial success.

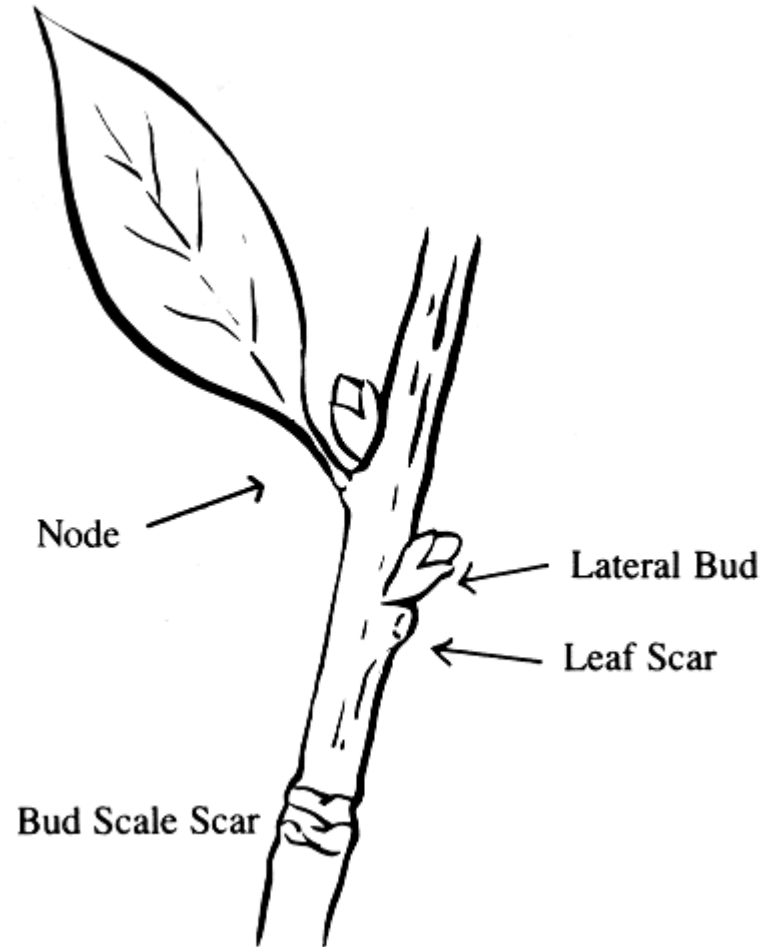
**Synthesize your work from  
Step 4**



# Template Slide #4 Outcomes

## Outcomes

- I hope to take this project and apply some of the data we observe to the remainder of the village owned green space.
- The mortality rate and amount of growth through each season.



# Project: Place & Purpose

**Goal:** Develop an invasive species management plan for Columbus County Park, a 411-acre public park in Columbus, Michigan

**Most of the habitat is Beech-Maple Forest that has been clear-cut and regrown. The Belle River runs through the park, and there are some reverting farmland areas/grasslands and wetlands within the park.**

**Key stakeholders:**

- St. Clair County Parks & Recreation Commission
- Parks & Friends of the St. Clair River staff
- Management contractors
- Community volunteers



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# **Climate Change Impacts, Challenges & Opportunities**

**The most significant impact for this project is that both invasive and native plant species shifts are likely to occur.**

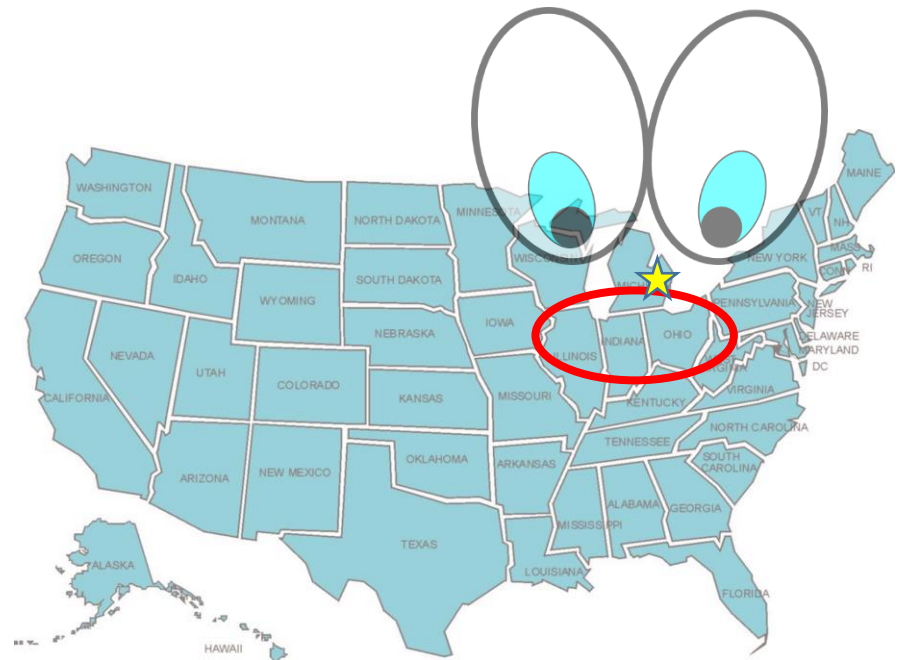
**Challenges for this project include that new species introductions and migrations, exact locations, species shifts and rate of change are difficult to predict. Stakeholders may have little or no experience with climate change adaptation.**

**There is opportunity with this project to begin including climate change and adaptation planning into our stewardship program, and to use this project to adapt our other stewardship activities and sites for climate change.**

**1. Develop a training program based on and using the MISIN tools to teach stakeholders how to help watch for, monitor, measure and manage invasive plant species and adapt for climate change.**

**2. Consider allowing some species, such as Black Locust, now considered invasive, exotic or undesirable.**

**3. Become knowledgeable about invasive and native plant species and natural communities from states just south of Michigan, as these are most likely going to migrate northward.**



# Key Outcomes & Measures of Success

## Key outcomes expected:

- Engage community in park stewardship
- Develop core group of trained volunteers & staff to help manage park
- Prevent, slow the spread, & reduce amount of invasive plant species
- Protect & enhance native biodiversity & habitat climate resilience

## Measures of success:

- Consistently expanding cadre of volunteers
- Staff & volunteers grow in their knowledge & competencies
- Reductions in invasive species populations
- Native species populations conserved or increased



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**Final Thoughts?**

# **NEW Export and Share Plan Layout!**

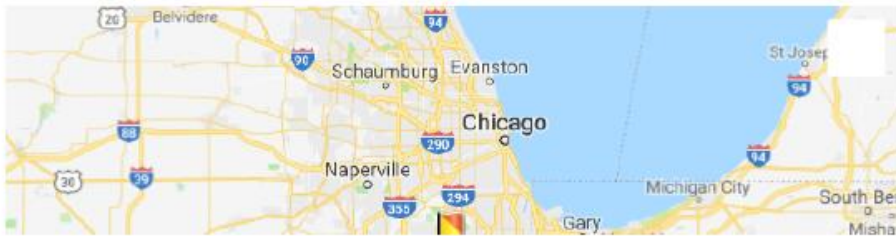
# Climate Change Adaptation Plan

Chicago project

December 18, 2018

Prepared by Leslie Brandt

Prepared using the Adaptation Workbook - [AdaptationWorkbook.org](http://AdaptationWorkbook.org)



Property details

**Acres:** 2

**Size:** 2

**Ownership:** Federal  
demo

# Table of Contents

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  - a. Park
  - b. riparian buffer
2. Climate Change Impacts and Vulnerabilities
  - a. Regional Climate Impacts and Vulnerabilities
  - b. Park
  - c. riparian buffer
3. Evaluation of Management Objectives
  - a. Park
  - b. riparian buffer
4. Adaptation Tactics
  - a. Park
  - b. riparian buffer
5. Monitoring Plan
  - a. Park
  - b. riparian buffer
6. References

## 1b. riparian buffer: Goals and Objectives

this is where you'd describe your location.

Goal	Objectives and Timeframes
Increase species diversity	
Increase canopy diversity	

## 2. Climate Change Impacts and Vulnerabilities

Climate change will not affect all places in the same way. This section describes the anticipated effects of climate change within a region, and then provides additional details how specific places within the project area may be affected.

### 2a. Regional Climate Impacts and Vulnerabilities

Potential Climate Impact - Regional	Property or Project Area Considerations
Mean annual temperature in the Chicago area is projected to increase by 2.3 ° to 8.2 ° F by the end of the 21st century, with temperature increases across all seasons. (7, 8, 14)	
Precipitation in the Chicago area is projected to increase in winter and spring over 21st century, but projections for summer and fall precipitation are less clear (7)	
Heavy precipitation events in the Chicago area have been increasing and are projected to continue to increase further, which could increase runoff and local flooding from stormwater (9, 8, 10)	
Extreme and exceptional droughts in the Chicago area may increase in duration, frequency, and spatial extent compared to the end of the 20th century (13, 2)	
Increases in temperature may lead to an increase of 1-2 hardiness zones and 2-4 heat zones in the Chicago area. (7)	
Species distribution modeling for native species suggests that suitable habitat may decrease for 15 primarily northern species and increase or become newly suitable for 47 species in the Chicago area. (7, 4, 3)	
For species for which no model information is available (rare, nonnative, or cultivars), shifts in heat and hardiness zones could have a positive effect on about 23 percent of species that are either present in the Chicago area or considered for planting, (7, 4, 3)	

### 3. Evaluation of Management Objectives

Climate change might make management objectives for this property harder or easier to achieve, presenting challenges and opportunities. This section also includes a simple rating and description for the feasibility of meeting management objectives under current management. This is a critical step to evaluate whether management objectives are robust, or whether any might need to be changed.

#### 3a. Park: Evaluation of Management Objectives

**Management Goal:** Increase species diversity

Management Objective	Challenges and Opportunities	Feasibility
Have no more than 20 percent of a family, 10 percent of a genus and 5 percent of a species (15 years)	<p><b>Challenges:</b></p> <ul style="list-style-type: none"><li>• Some more northern species may no longer be able to survive, reducing possible species for planting.</li><li>• Diseases such as oak wilt and bur oak blight may become more severe, leading to more mortality of existing species.</li></ul> <p><b>Opportunities:</b></p> <ul style="list-style-type: none"><li>• New species could potentially be planted.</li></ul>	<p><b>Feasibility:</b> Medium</p> <p><b>Feasibility Comment:</b></p> <p>In the short term, there may be a loss of species due to mortality, but overall more potential to enhance diversity in the long-term as trees are replaced.</p> <p><b>Other Considerations:</b></p> <p>Current policies limit the planting of more than two species on a city block. Budgets limit the number of trees that can be planted.</p>

## 4. Adaptation Tactics

After considering the challenges and opportunities climate change might present for this management objective, these actions were identified to help prepare for climate change impacts. Each adaptation tactic is linked to one or more Adaptation Strategies and Approaches, which provide connections to more general concepts related to forest management and conservation. Tactics that are recommended can be implemented or explored further.

### 4a. Park: Adaptation Tactics

**Tactic:** qew

**Practicability:** Medium

Adaptation Strategies and Approaches	Benefits, Drawbacks and Barriers	Associated Management Objectives
<b>Reduce the impact of biological stressors</b> <ul style="list-style-type: none"><li>Maintain or improve the ability of forests to resist pests and pathogens</li></ul>	<b>Benefits:</b> werw <b>Drawbacks and Barriers:</b> gew	<ul style="list-style-type: none"><li>Have no more than 20 percent of a family, 10 percent of a genus and 5 percent of a species (15 years)</li></ul>

## 5. Monitoring Plan

Monitoring is critical for understanding if management actions are effective or if management should be altered in the future to account for new information. The following monitoring variables were described for this particular management objective and adaptation tactics.

### 5a. Park: Monitoring Plan

**Monitoring Variable:** Survival of newly planted street trees

Criteria for Evaluation	Plans for Implementation	Associated Management Objectives
70% survival at 5 years	Homeowner calls, annual checks.	<ul style="list-style-type: none"> <li>• Have no more than 20 percent of a family, 10 percent of a genus and 5 percent of a species (15 years)</li> <li>• Increase the percent of species that are native or expected to gain habitat in the area.</li> </ul>

# forestadaptation.org/demos

**Climate Change Response Framework**

Home Our Approach Projects Demos Products Partners Resources Contact Team Pages

Map Satellite

● Start-Up ● Planning ● Action ● Evaluation

Central Appalachians

Central Hardwoods

Mid-Atlantic

New England

Northwoods

Urban

**Demonstration Projects**

Demonstration projects are real-world examples of how managers have integrated climate considerations into forest management planning and activities. These projects use the partnerships and resources developed through the Framework to test new ideas and actions for responding to changing conditions. Demonstrations come in all shapes and sizes, showing a variety of adaptation actions that also achieve forest management goals.

Keywords Full List State Landowner Type Status

**Holden Arboretum: Working Woods**

The Sherwin Institute for Woodland Management provides educational opportunities for owners of property from small urban lots to rural woodlots of 10-15 acres to increase their knowledge of how to properly care for, manage, and utilize their trees for environmental, ecological, social, and economic benefits. The Institute's programs and facilities promote the beauty and importance of trees and other woody plants to create vibrant green communities and native forests within the

News & Events

[Training Opportunities](#)

# Continued Assistance

## Northern Institute of Applied Climate Science



Climate Change Response Framework: [www.forestadaptation.org](http://www.forestadaptation.org)

USFS Climate Change Resource Center: [www.fs.usda.gov/ccrc](http://www.fs.usda.gov/ccrc)

USDA Northern Forests Climate Hub: [www.climatehubs.ace.usda.gov/northernforests](http://www.climatehubs.ace.usda.gov/northernforests)

# Upcoming Events and Activities

- **January-February, 2019:** New England and Central Hardwoods Forest Adaptation Planning and Practices-Online
- **Fall, 2019:** Next session of Urban Forestry Planning and Practices-Online.
- Let us know if you'd like to schedule a regionally-focused in-person workshop or training.

# Closing Items

- **Complete course evaluations (one per participant)**
- **Export & Share your Plan** – We hope you use it, now that you've perfected it
- **Workbook is Yours** – keep using for future projects
- We will ensure you receive ISA CEUs if applicable. Please send us your member numbers if you have not done so already.
- Follow-up email with info on Demo projects, etc.
- **Keep in touch!** We are always available as resources.

**Thanks SO MUCH, everyone!**