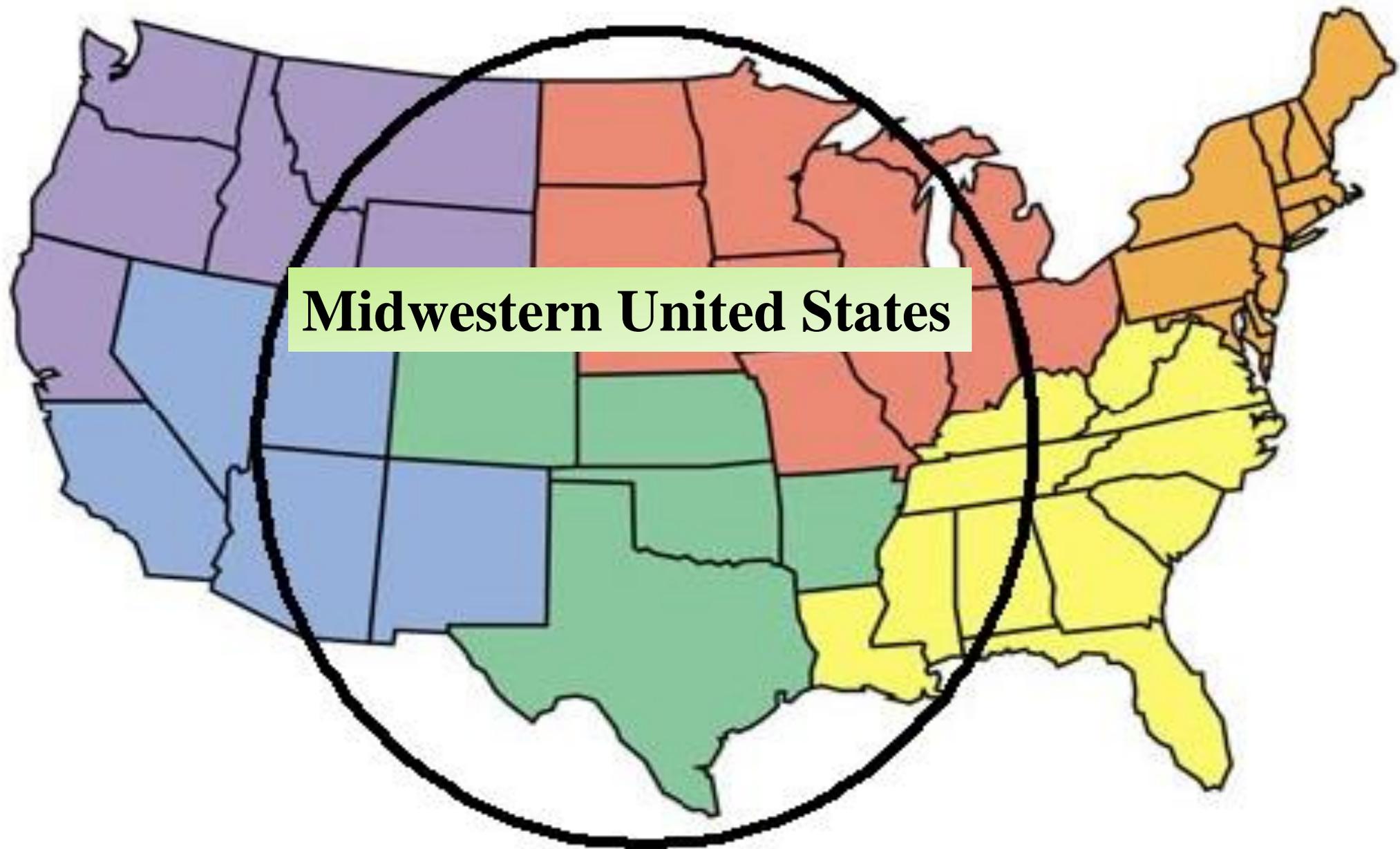


Managing Threats to Community Forests in the Upper Midwest

Trees, People and Towns Conference

July 12-14, 2016

Nebraska City, NE



Midwestern United States

- Potential For Unacceptable Damage or Losses



What's A Threat?

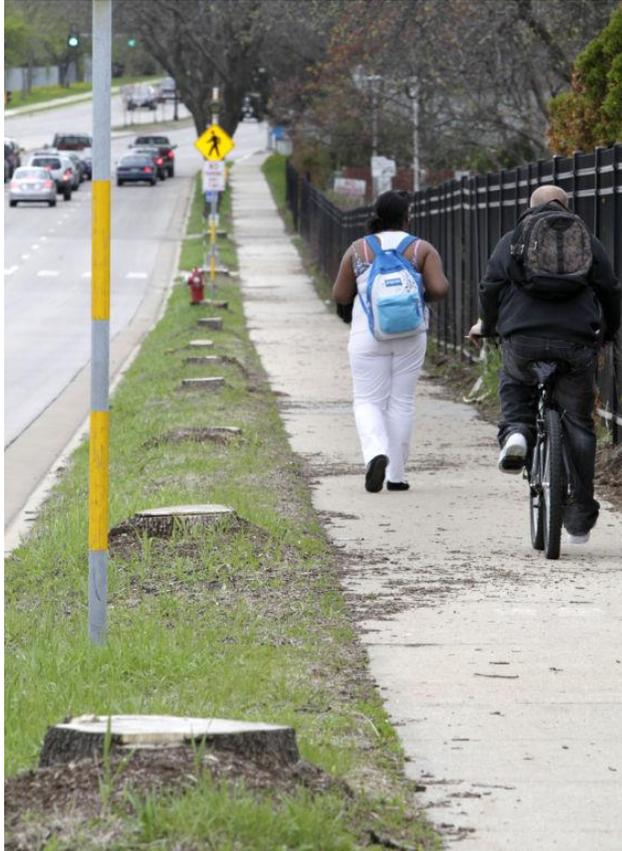
- Limited or Unknown Control Tactics



Imprelis™ Damage on Spruce

What's A Threat?

- Unknown Impact On A Community's Capacity



What's A Threat?

- Trends Toward Higher Frequencies



What's A Threat?

- Over-Dependency On Limited Resources



One Tree Is Not A Green Ash

What's A Threat?

The Threat Survey*

Says...

- Insect Pests and Diseases
- Climatic Stresses
- Limited Diversity
- Poor Preservation Practices
- Stagnant or Declining Budgets
- Public Sector Engagement



Photo: J. Ryg

- Municipal Tree Care and Management in the United States: A 2014 Urban and Community Forestry Census of Tree Activities
- Interviews with: Private tree care consultants, municipal arborists and urban foresters, agency tree health specialists
- State Forest Action Plans and UCF Reports (MN, SD, ND, KS, NE, CO, MT)

“Threat Survey” Resources

Insect Pests and Diseases

- Emerald Ash Borer
- Mountain Pine Beetle
- Pine Wilt Syndrome
- Dutch Elm Disease
- Oak Wilt/Bur Oak Blight
- Thousand Canker Disease

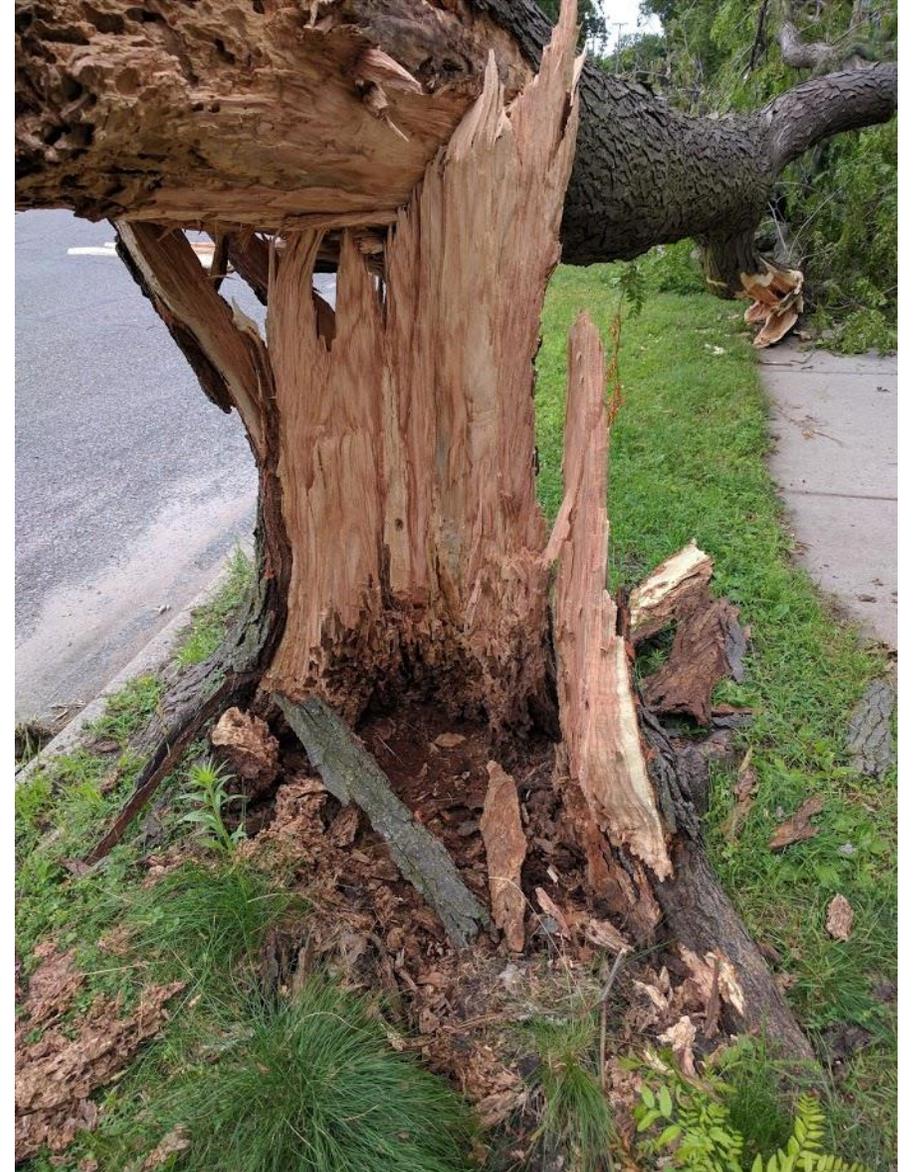




Dutch Elm Disease

Climatic Stresses

- Higher Frequency and Intensity of Loading Events
- Chronic Drought
- Increase in Average Daily Temperatures





Southwest MN and Southeast SD - 2013

Limited Diversity

- By Species
- By Biomass
- By Distribution



Princeton Elms



Poor Preservation Practices



increase (38.6%). Few (12.6%) thought the budget would decrease. Nearly half (46%) of the respondents from the Midwest indicated that their budgets would increase. Emerald ash borer is currently a major pest issue that is causing communities to treat, remove, replant thus increasing needed funding.

Was the current budget adequate to meet identified needs? Over half (53%) of communities indicated the budget was adequate to meet currently identified needs (Figure 2-12). Communities above 100,000 were less optimistic that the budget was adequate.

Respondents with an inadequate budget indicated how much their budget is below an identified need. Communities were a mean 45% (4.6 SEM) level below an identified need.

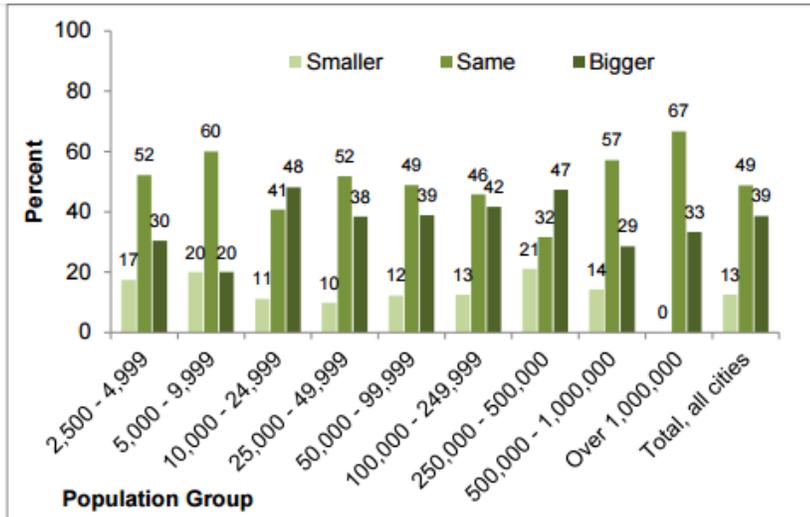


Figure 2-11. Is your community tree budget smaller, the same, or bigger this year compared to last year? (n=414)

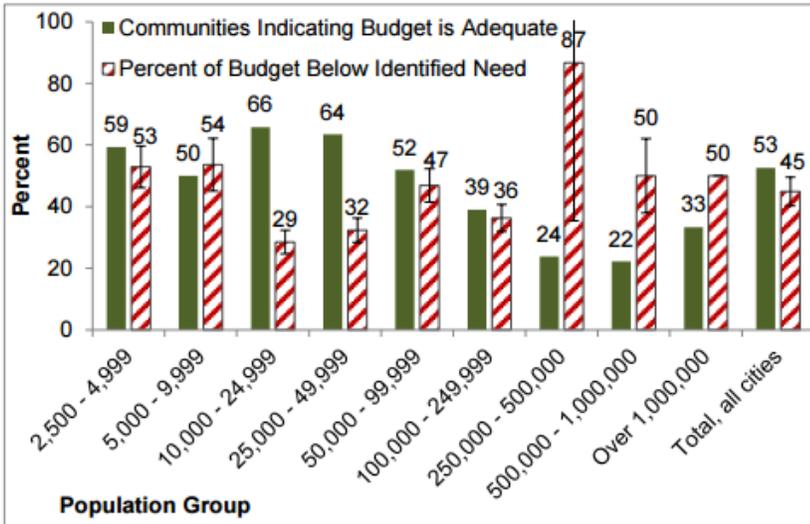


Figure 2-12. Is your budget adequate to meet current needs as defined in your work plan or your identified annual urban forestry budget needs? (This includes planting, maintenance, removal, inventory, education, etc.) (n=512 for community budget; n=186 for % below identified need)

Stressed Budgets

Valley Forge Elm



Autumn Blaze Maple

- No Messy Trees
- More Maples
- Don't Treat Ash
- Trees Are Amenities
- I Don't Want That Tree
- No Boulevard Trees
- Don't Remove That Tree!

Public Sector Engagement



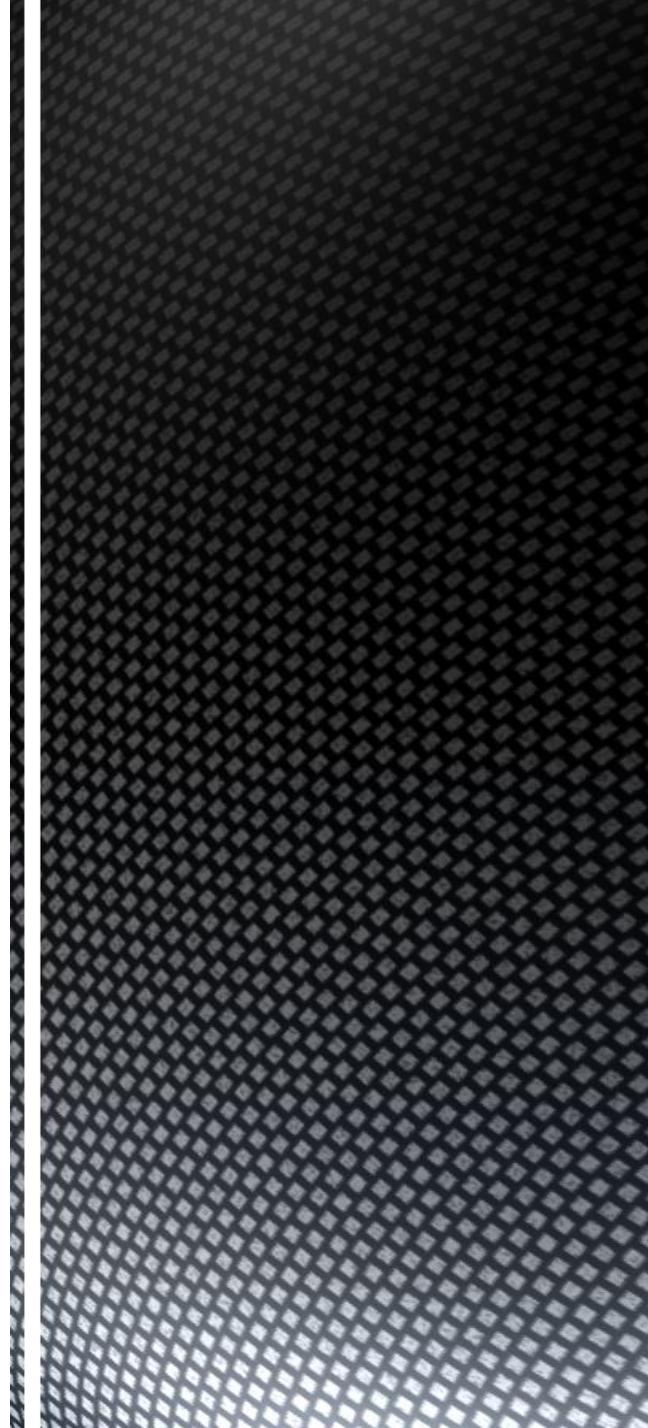
New Sidewalk, New Curb
Second Time Around



No
Messy
Trees!



Part II:
Managing (some)
Threats



■ Genetic

Diversity... What Are You
Willing To Lose? (the red
ones or the yellow ones?)



Rethink and
Embrace
Diversity

- Maples
- Ash
- Spruce
- Pine
- Oak



Upper Midwest Dominant Tree Species



A Good Mix of Genes

- Oak
- Birch
- Hackberry
- Spruce
- Pine
- Linden
- Buckeye



Different Story:
1 Pine
4 Aspen
23 Norway Maples

Limited Diversity by Distribution



Biomass Diversity?
Medium to Large DBH
Should Dominate the
Landscape

Good Species Diversity but
Dominated by Smaller Trees

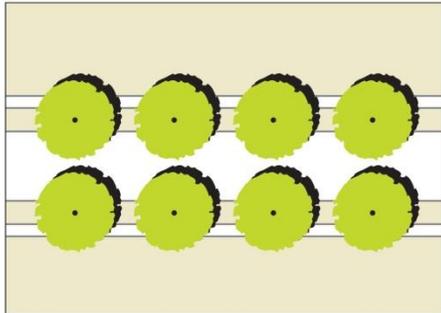


Figure 5.1. Repetition of a single species on both sides of street.

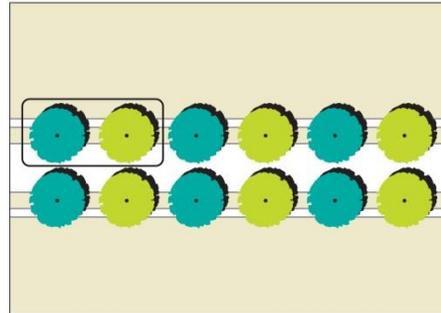


Figure 5.2. Repetition of a "module" comprised of two species, duplicated on opposite sides of street. Also a basic example of sequence.

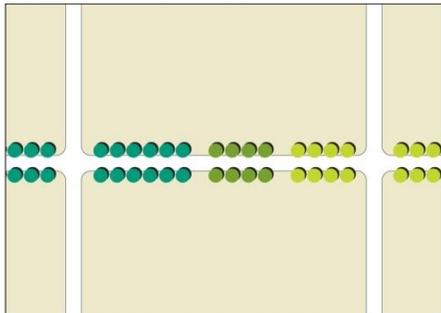


Figure 5.3. Sequence provided through gradation of a physical characteristic (e.g. foliage texture or color).

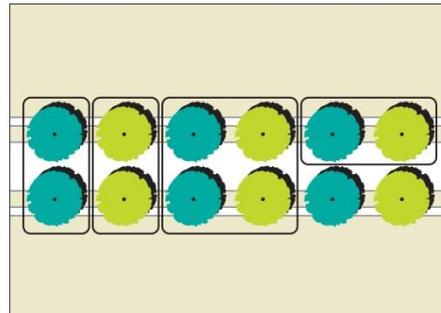


Figure 5.4. Sequence provided through the repeated alternation of two species or alternation of a modular block comprised of a two-species combination.

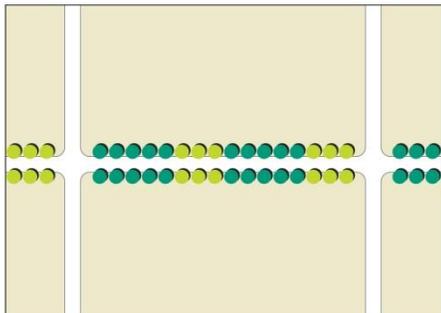


Figure 5.5. Sequence provided through repeated alternation of two single-species modules.

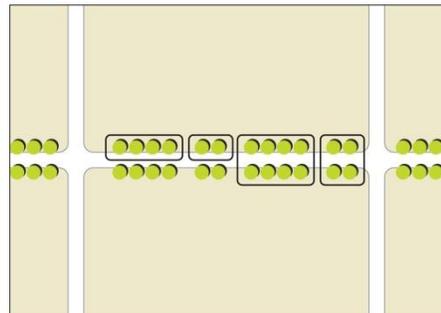


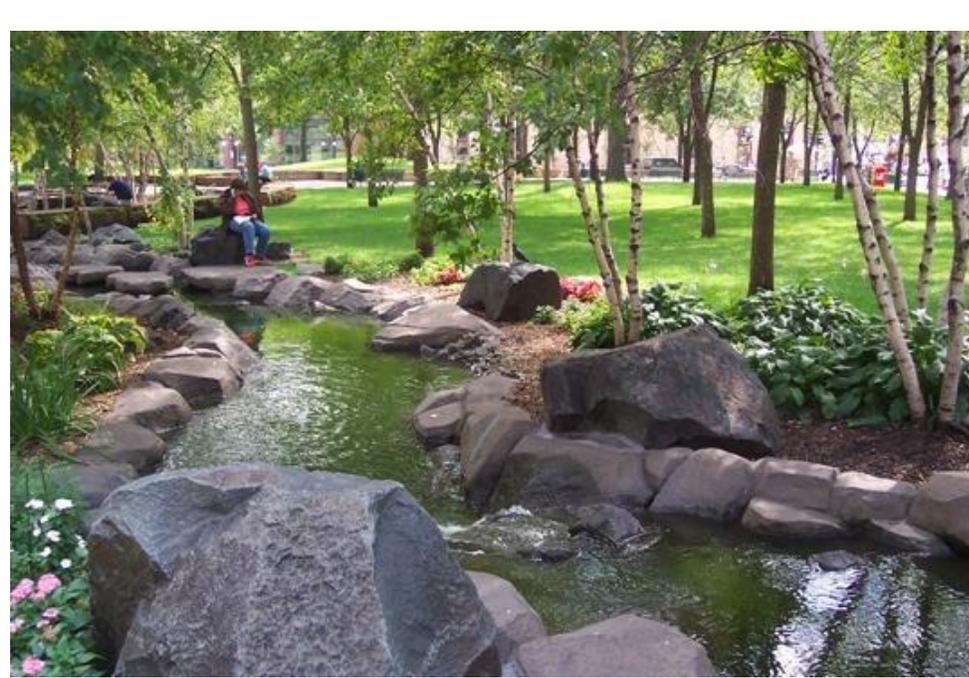
Figure 5.6. Sequence provided through repeated alternation of single-species modules with repeated uniform separations or gaps between modules.



Diversity by Design



Alternate Elms With Other Species



Diversity
by Land
Use

- Chronic Drought
- Warmer Nights
- Loading Events



Managing Climate Extremes

- Summer, Seasonal,
Drought-like Sites

Chronic Drought Events



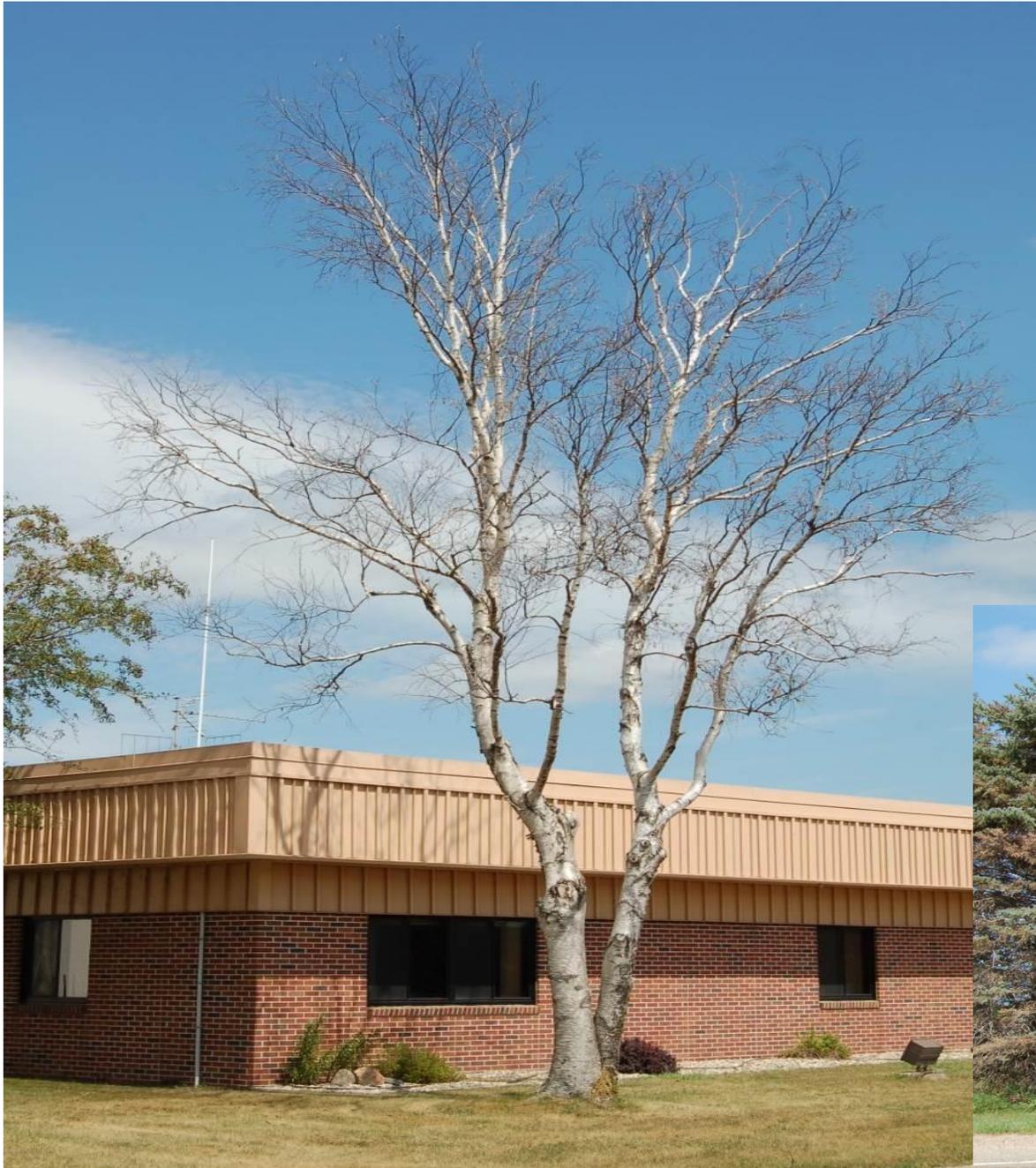
Western Minnesota – July, 2012

Extended Seasonal Drought



Photos by Mark Vitosh

Bronze Birch Borer



Cytospora Canker & Salt Spray



Drought-Like Sites



- Less Night-time Recovery

Increasing
(night)
Temperatures



Siesta Time





Siesta Time



Recovery Potential



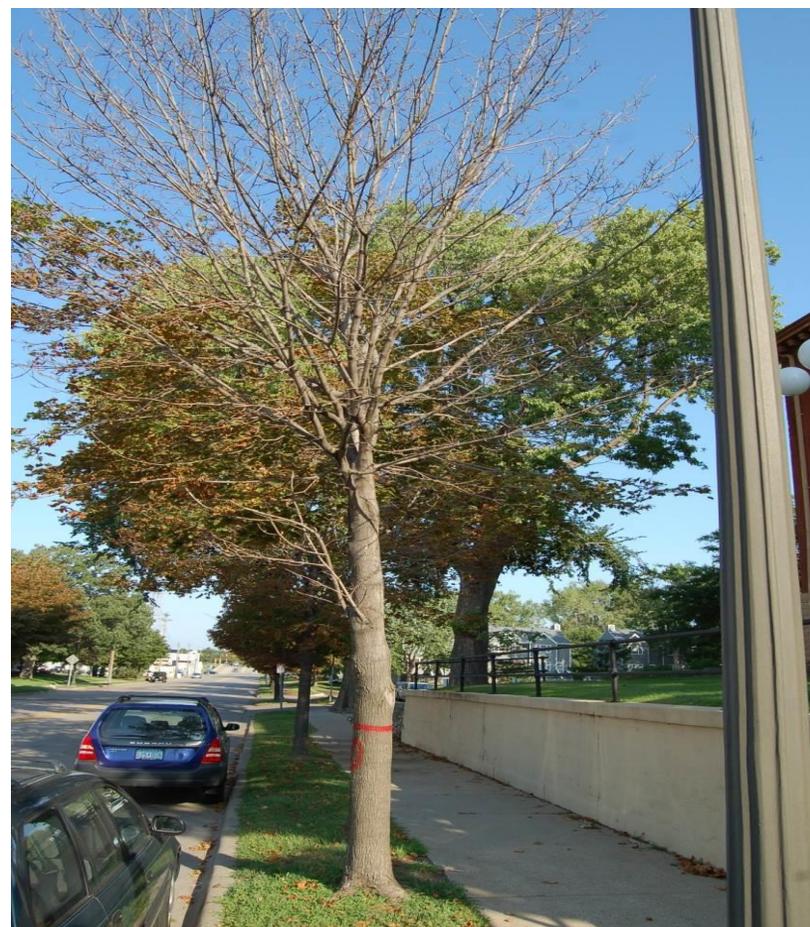


Compromised Recovery Potential



Compromised Recovery Potential

Extended Heat and Water Stress



- Wider Boulevards or ROWs
- Engineered Soils
- Tough Trees...Regardless of Homeland

Some Solutions?

Wider Boulevards or ROWs



- How Well Will Trees Grow And For How Long In:
 - Engineered Soils, AKA, Structural Soils?
 - In Suspended Pavements?
 - In Layers of Rocks, AKA, The Stockholm/Swedish Soil?





Swedish Soil



Suspended Pavement Systems



Managing Water at the Tree Level





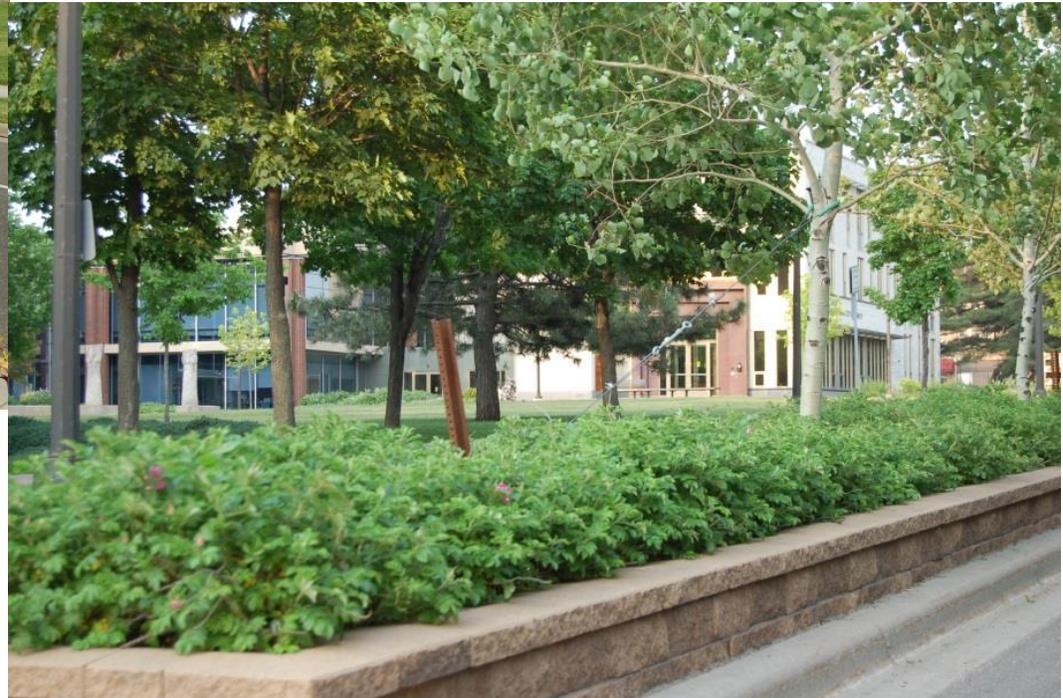
Managing Water at the Tree Level



Managing Water During Establishment: Frequency over Dosage



Higher Frequency Requirement



Lower Frequency Requirement



Managing Water at the Tree Level

Photo: Kate Lamers



■ Newly Planted

- Dose @ 1-1.5 gallons of water per caliper inch of trunk diameter
- *E.g., 2" Caliper x 1.5 gal. /inch = 3 gallons per dose (2 cents per dose)*

■ Established (10" DBH)

- *\$61 per season @ 1x/week*
\$2.95 per dose



■ Mature (30" DBH)

- *\$549 per season (\$548.86 exactly),*
\$26.14 per dose



Water Costs for Each Life Stage*

*University of Minnesota, 2011. "How much does it cost to water this tree?"



Managing Water at the Site Level: Reservoirs and Surfaces

Building a “Suspended Pavement” Infrastructure



Managing Water at the Site Level: Reservoirs and Surfaces

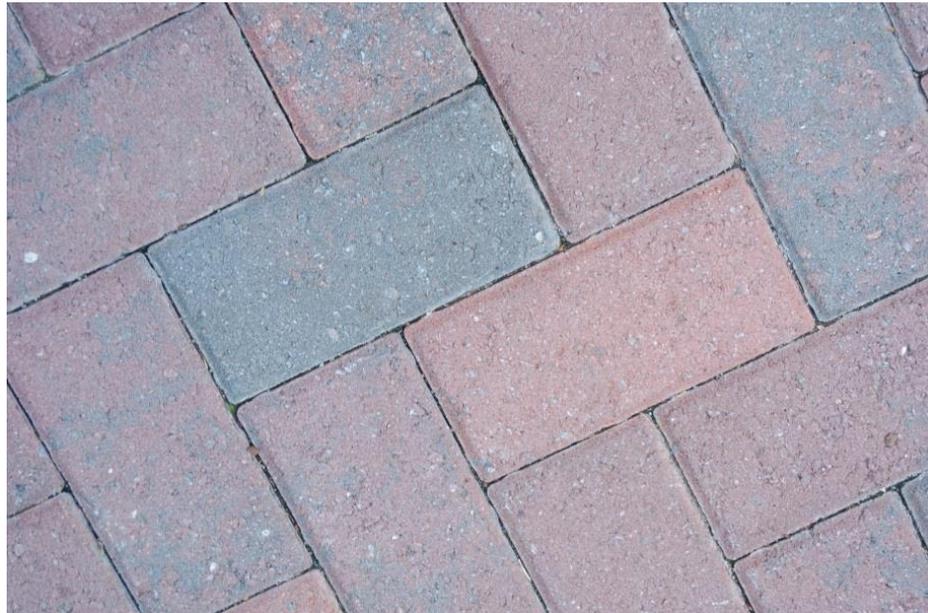
Building a “Suspended Pavement” Infrastructure



Managing Water at the Site Level: Pervious Surfaces



Managing Water at the Site Level: Pervious Surfaces



Managing Water at the Site Level: Pervious Surfaces



Resin-bonded Aggregate



Managing Water at the Site Level: Pervious Surfaces



Pervious Concrete



Managing Water at the Site Level: Pervious Surfaces

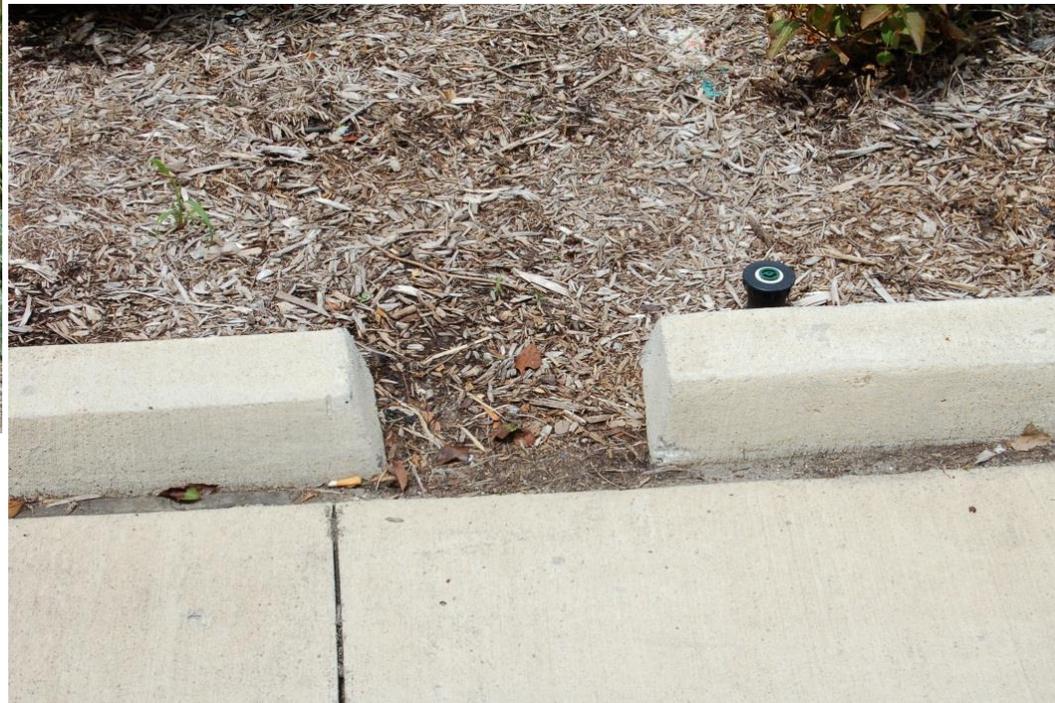


Managing Water at the Site Level: Pervious Surfaces





Managing Water at the Site Level: Cut Curbs



- Bur Oak
- Turkish Filbert
- Katsura Tree
- Shingle Oak
- Thornless Osage-Orange
- Manchurian Ash
- Male Ginkgo
- Hardy Rubber Tree
- No Maples

Tougher Trees...No Forest Trees



©2003 University of Nebraska Cooperative Extension in Lancaster County
Photo by: V. Jedlicka Visit <http://lanaster.unl.edu>

1. Wind

- Thunderstorms (30 mph+)
- Straight-lined Winds (65 mph+)
- Tornadoes (65 mph+)



Most Common
Loading Events

2. Ice

Most Common Loading Events



Worthington, 2013

Duluth, 2009



3. Snow

Most Common Loading Events



Photo: J. Ryg

- Poor Architecture
- Dysfunctional Root Systems
- Decay



A Dave Hanson Photo

Urban Trees Predisposed to Loading Events



Poor Architecture





Dysfunctional Root Systems



An Eric Berg Photo





Sidewalk
Shaving



Decay



And Little Things That
Aren't Supposed To
Happen!



DED Resistant
American
Elms... 1-2 Year
Pruning Cycles



Average Pruning
Cycle is 6.5
Years*

Princeton Elm –
Four Years After
Planting

- Silver, Boxelder Maples
- Red, Freeman Maples
- Basswood
- Hackberry
- Red Oak
- Spruce
- DED American Elms
- Big Trees in Little Places
- Severed Roots from Sidewalk Panel Replacement

Minimize The
Chronic
Problems

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