TREE INVENTORIES

GRAHAM HERBST
COMMUNITY FORESTER - EASTERN NEBRASKA
NEBRASKA FOREST SERVICE
WHY TREES?

- https://youtu.be/74063UKSmXw
Community Comprehensive Plan

- Environmental Element
  - Should have clean language stating need for planting, maintenance and preservation of trees in open spaces and along streets

- Transportation Section
  - Should have clear language calling for aesthetic consideration in the development of traffic circulation systems and provide adequate right of way space for tree planting
Community Forest Management Plan

- Plan should contain the following
  - Maintenance standards
  - **Tree inventories**
  - Work records
  - Planting plan
  - Removal plan
  - Tree selection process
  - Design criteria
  - Personnel training and development
  - Coordination with departments and other agencies
Tree Inventories

Purpose

- Obtain and organize information about:
  - Total number of assets
  - Species diversity
  - Condition
  - Distribution of trees throughout the community
Tree Inventories

- Critical tool in the community forest management process
- Should be part of the overall community comprehensive plan under both the environmental and transportation sections
Inventories

- Tree inventory system planning
- Improves the efficiency of the urban forest operations
- Justifies budget requests
Who Needs an Inventory?

- Municipalities
- College Campuses
- School Districts
- Home Owners Associations
“Inventories not only give you an accurate picture of the current conditions of the community forest, they tell a story of what the urban forest will look like in the future.” ArborPros
Municipalities have the tasks of:
- Long term planning
- Continuous maintenance
- Keeping current tree species lists
- Pruning
- Planting
- Mulching
- Pest management
Inventories are valuable

- **Municipalities**
  - Tool for managing budgets and justifying budget increase requests
  - Critical for managing emerging insect and disease issues
  - Developing management strategies because of changing climate conditions
  - Assist with developing plans for sidewalk infrastructure repair/replacement

- **Utility companies**
  - Use inventories to track line clearance needs, problematic species around lines and areas that need more frequent clearance

- **Landscape Contractors**
  - Utilize on HOA properties and commercial projects
    - Develop yearly management plans, create work orders and proposals and create maps for clients and show monetary value of clients' trees
Types of Inventories

- Sample
- Partial
- Full
Sample Inventory

- Random selection of community trees
Partial Inventory

- Provides information on a portion of the community trees
  - EX. Inventory only community ash trees
  - EX. Inventory only a particular area of community
  - EX. Locating all dead and dying trees
Full Inventory (Public)

- Identifies ALL public tree AND empty planting sites
  - Counts all public trees in right-of-ways, parks, golf courses and any municipally owned land
Methods of Inventorying

- Windshield Surveys
- GIS-based Inventories
Windshield Surveys

- Only a snapshot in time, provides only static information
- Generally done with volunteers and forestry staff
- Typically done on a tally sheet (paper and pencil)
- Provides limited information
- Identifies tree species only to genus typically
- Estimates size of tree
- Communicates condition of tree
  - Excellent
  - Good
  - Fair
  - Poor
<table>
<thead>
<tr>
<th>SPECIES</th>
<th>1-8 Inches</th>
<th>9-16 Inches</th>
<th>17-32 Inches</th>
<th>32+ Inches</th>
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<td>308</td>
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</tbody>
</table>
GIS-Based Inventory

- Living document that can always be changing, can be kept up to date
- Locations of trees can be very specific, GPS coordinates
- Provides mapping to quickly locate specific trees
- Can capture lots of information that can be uploaded to tree benefit/valuation software such as iTree
- Can produce work orders from information
- Can be utilized with community disaster readiness plans/emergency management plans
- Calculates community tree stocking rates, can identify locations for planting
myTreeKeeper

i-Tree

- https://www.itreetools.org/
### Tree Condition Classifications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>Healthy, vigorous tree. No apparent signs of insect, disease, or mechanical injury. Little or no corrective work required. Form representative of species.</td>
</tr>
<tr>
<td>Good</td>
<td>Average condition and vigor for area. May be in need of some corrective pruning or repair. May lack desirable form characteristics of species.</td>
</tr>
<tr>
<td>Fair</td>
<td>General state of decline. May show severe insect, disease, or mechanical damage, but death not imminent. May require major repair in renovation.</td>
</tr>
<tr>
<td>Poor</td>
<td>No chance of correcting a declining condition, death imminent.</td>
</tr>
</tbody>
</table>

### Tree Condition

- **Excellent**: 72%
- **Good**: 14%
- **Fair**: 12%
- **Poor**: 2%
Stocking Rate Math

3,240 inventoried street trees divided by 165.29 street miles = 19.6 trees/street mile

19.6 trees/street mile divided by 200 trees/street mile = 9.8% stocked
   (Actual)

200 trees/street mile X 142.92 street miles = 33058 trees if fully stocked

Identifying Planting Vacancies

1. Look into community ordinances involving tree planting near streets
2. Visit planting site in question
3. Look for overhead power lines and surface obstacles (mailboxes, fire hydrants, etc.)
4. Locate underground obstacles (water lines, power lines, etc.)
5. If no issues found, identify proper tree species for the site
EAB Readiness Planning

AMY SEILER
WESTERN COMMUNITY FORESTRY SPECIALIST
NEBRASKA FOREST SERVICE
Ash-lined street

3 years later

EAB: aggressive tree killer
Host: Ash (*Fraxinus* spp.)

- **Green**
  - *Marshall’s Seedless*
  - *Patmore*

- **White**
  - *Autumn Purple*

- **Black**

- **Blue**
• Red Oak, IA = 30 miles
• St. Joseph, MO = 30 miles
• Kansas City = 60 miles
• Boulder, CO = 95 miles
Community Readiness Planning

- Inventory trees
  - ash #s
  - location
  - size
  - condition
- Write a management plan
- Remove marginal trees now
- Plant a diversity of trees
- Public awareness
- Consider treatments
Inventory

North Platte Relative Age Distribution of Top 10 Public Tree Species (%)
10/22/2012

Tree Condition Classifications

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Develop a Preparedness Plan In Advance

- Removal of Fair and Poor Quality Trees in advance of EAB
- Determine what trees are to be treated
- Start planting diverse tree species NOW
- Begin a public awareness campaign
  - EAB will affect private property more than public property in the west
  - Public officials need to be made aware of cost to communities so they can start to budget accordingly
Treatment

- Identify high-value ash trees and create a plan for protection
- Determine if you will treat some trees to slow the progression of tree death in communities
Treatments: A Balancing Act

Protect trees from EAB:
- Aggressive tree killer
- Valuable trees
- Early detection difficult

Treatment Drawbacks:
- Required for lifespan
- Damage to trees
- Environmental effects
- Human exposure
- Monetary cost
Damage to Trees

All trunk injections cause damage:

• Holes made in trunk
• Chemical itself
Be selective when deciding which trees to treat (if any)
Good Candidates for Treatment

- Within 15 miles of EAB
- High value
- Good location
- History of proper care:
  - Watering
  - Mulch
  - Protection of root zone
Healthy trees:

✓ Better handle the damage caused by treatments
✓ Respond better to treatments
Poor Candidates for Treatment

Thin crowns
Branch dieback
Poor Candidates for Treatment

Epicormic shoots
(water sprouts, suckers)
**Poor Candidates for Treatment**

Epicormic shoots
(water sprouts, suckers)
Poor Candidates for Treatment

Decay conks
Poor Candidates for Treatment

Hollow stems
Decay
Large pruning cut not sealed
Poor Candidates for Treatment

Other borer activity
Poor Candidates for Treatment
Poor Candidates for Treatment

“Mower blight”
Poor Candidates for Treatment

Included bark
Poor Candidates for Treatment

Too close to sidewalk
Overhead wires
Poor Candidates for Treatment

Small tree
Identify Marshalling Yards

Removing Trees and Processing Woody Debris
Best times to remove infested trees: Fall, Winter, Early Spring

Dropping trees when adults are active (late spring to summer) causes adults to fly to new areas.
Quarantine area: the area from which regulated articles cannot move without certification
**Quarantined items:**

- All life stages of EAB
- Ash nursery stock
- Ash limbs, branches, logs, lumber, chips, stumps, debris, etc.
- Firewood of all hardwood species
- Any other article presenting a risk of spreading EAB
Compliance Agreement

- Legal document that describes requirements for handling regulated articles to prevent spread
- Federal (USDA) and State (Neb Dept of Ag)
- Regulatory official works with you to access your situation and provide necessary training
- Periodic inspections
Compliance Agreement

Ash logs & lumber and all hardwood firewood

• heat treat to 60° C for 60 minutes

• 100% bark free + ½ inch wood

• kiln sterilization

• methyl bromide
Compliance Agreement

Hardwood chips and mulch: Max: 1 x 1 inch
Ash nursery stock: No certification available

Neb Dept of Ag: 402-471-2351
USDA APHIS PPQ:
Emerald Ash Borer Specimen: Chain of Custody and Communications

Always maintain confidentiality until diagnosis has been officially confirmed.

Detection
- State EAB Survey
- Parks Worker
- Forester
- Arborist
- Nurseryman
- Utility Worker
- Homeowner
- Master Gardener
- Landscape Manager
- Crop Consultant
- First Detector
- Insect Collector

Pre-Screening
- UNL Extension
- Nebraska Dept. of Agriculture
- Local USDA-APHIS
- Nebraska Forest Service

Identification
- UNL Extension Diagnostic Clinic (PPQ Form 391)
- USDA Systematic Entomology Laboratory
- USDA APHIS EAB National Policy & Operations Managers

Feedback
- USDA Designated Identifier

EAB Suspected
- UNL Extension and Diagnostic Clinic
- Nebraska Dept. of Agriculture
- Local USDA-APHIS
- Nebraska Forest Service

Communication
- Release information. (NDA takes lead.)

Mobilization
- Local Mobilization

Confirmation
- USDA APHIS EAB National Policy & Operations Managers

Local Mobilization
- USDA APHIS EAB National Policy & Operations Managers

Release information. (NDA takes lead.)

Communication
- Release information. (NDA takes lead.)

Mobilization
- Local Mobilization
Develop a Diverse City Tree List
Public Awareness
Questions???

Special thank you to Laurie Stepanek for use of slides
Planting with a Purpose

GRAHAM HERBST
NEBRASKA FOREST SERVICE
144th Street

- Very high pH in median and shoulder; good in exterior ROW
- Low soil fertility
- Good species selection known for drought and salt tolerance
- Moderate to high compaction levels
- Adequate soil volume, salt levels
- Mower blight on 60% of median trees
Dodge st Median

- ~10 year old planting
- Amended soil; good fertility
- Mulched in association with perennials and **irrigated**
- Good species selection with honeylocust
Happy Hollow Boulevard

- All trees; turf, no mulch, good soil volume
- 39% mower blight
- 17% deep planting
- Good age and species diversity
- Good soil organic matter, pH, and compaction
- 51% excellent condition
Riverfront Drive

- Small diameter one-time mulch application
- Associated with irrigated turf; spray heads
- Over 70% planted deep
- Nearly 40% mower blight
- 55% of trees fair, poor or dead
- Extensive hail damage contributed to decline of thin-barked trees (maple)
- Good performance by oak species
Downtown

- Good soil pH, high fertility
- Adequate soil volume after concrete cuts (over 25 sq ft)
- All trees mulched, some with perennial companion plantings
- 19% deep planting, NO mower blight
- Chinkapin oak, swamp white oak and hybrid elms all performing very well.
### Site Attribute Summary

<table>
<thead>
<tr>
<th>Site</th>
<th>Soil</th>
<th>Water</th>
<th>Management</th>
<th>Groundcover</th>
<th>Grouping</th>
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<td>Positive</td>
<td>Positive</td>
<td>Negative</td>
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</table>
Site Condition Summary

- **Excellent**
- **Good**
- **Fair**
- **Poor**

Graph showing site condition summaries for various sites.
Soil quality and management:

Reduction of compaction through deep chiseling and addition of organic material (compost and annual hardwood mulch).

Opportunities exist to define criteria and standards of practice as to how best to increase organic level via amendments and cultivation.
# Soil Analysis Report

<table>
<thead>
<tr>
<th>LAB NUMBER</th>
<th>SAMPLE IDENTIFICATION</th>
<th>ORGANIC MATTER</th>
<th>PHOSPHORUS</th>
<th>POTASSIUM</th>
<th>MAGNESIUM</th>
<th>CALCIUM</th>
<th>SODIUM</th>
<th>NUTRIENT AMMONIUM ACETATE EXCHANGEABLE</th>
<th>pH</th>
<th>BUFFER INDEX</th>
<th>CATION EXCHANGE CAPACITY CEC</th>
<th>PERCENT</th>
<th>BASE SATURATION (COMPUTED)</th>
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<tr>
<td>05685</td>
<td>14TH MED</td>
<td>2.1 L</td>
<td>28 H</td>
<td>103 VH</td>
<td>260 VH</td>
<td>387 VH</td>
<td>3131 H</td>
<td>217 VH</td>
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<td>189 H</td>
<td>333 VH</td>
<td>2728 H</td>
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<th>COPPER</th>
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</table>
Dodge Street Median Condition

- Excellent: 0%
- Good: 8.3%
- Fair: 30.0%
- Poor: 21.7%
- Dead: 40.0%

144th Street Median Condition

- Excellent: 0%
- Good: 9.10%
- Fair: 24.20%
- Poor: 30.30%
- Dead: 36.36%
Planting:

**TYPICAL TREE PLANTING DETAIL**

- Place top of root mass at or slightly above existing grade (2” max) first lateral roots 1-2” below soil surface.
- Mulch 2-4” deep to dripline or beyond. Keep mulch off trunk.
- If staking is necessary, use two opposing belt-like straps.
- Use plastic guard to protect from rabbit or mower damage.
- Root flare should be visible at base of trunk.
- Set root mass on undisturbed or firm soil.
- Dig hole 2-3x diameter of root mass (No Scale).
- Remove containers, wire, string, rope and tags. See note on burlap & wire basket. page 2.
18” hole from backhoe

15” pot

3” – 4” actual root ball

12” Root ball
Water:

Drip irrigation
Supplemental watering
Gator bags or similar methods.
Cultural impacts:

Mowers and other equipment must be kept from tree planting areas and this is best achieved through a mulching and herbicide program in conjunction with physical barriers and design attributes of turf associates.
Site Defects and Street Proximity
Ground cover requirements:

Mulching and mulch maintenance is a requirement for planting success. Long term improvements can also be achieved with soil quality and water availability through an appropriate mulching program.
Staking
Turf/Tree Interface
Group Planting:
Pruning and beyond
Thank you!

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