Urban Forest Health and Mortality in the Oklahoma City Metro Region

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Motivation

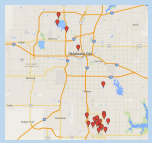
- Many cities wish to increase tree cover and/or improve the quality of existing forest by promoting large, healthy trees that provide high levels of ecosystem services.
- Urban trees may benefit from reduced competition and increased resource availability, but urban trees are generally assumed to:
  - face high stress conditions.
  - have shorter lifespans than trees in a non-urban environment.
- However, the role of natural stresses and disturbances vs. human causes is uncertain.

Questions

1. What factors are associated with poor tree condition (i.e. native status, size)
2. How much can poor tree condition can be attributed to natural factors vs. human causes?

Methods

- Field surveys and health/mortality assessments conducted in city parks located in Norman and Oklahoma City, OK
- 19 parks, 799 individual trees



surveyed locations

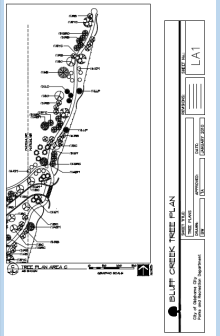
Tree mortality assessment

- Focused on trees planted in the last 5 years
- Based on field observations of city park plans and full surveys

Tree health assessment

- Trees were assessed for signs of insects, diseases and structural damage
- Overall condition was ranked (*excellent*, *good*, *fair* or *poor*)

OKC Parks Planning Data



Potential tree condition issues

Tree Insect/Disease

1	Elm Leaf Beetle
3	Webworms
5	Borers
6	Galls
7	Mistletoe

Tree Structural/Cultural

13	Light Deadwood (<30% Canopy Dead)
14	Improper Pruning (stubs evident)
15	Partial, unbalanced or crowded canopy
16	Storm Damage
17	Trunk Wound (lawnmower or weedeater)
18	Topped or Dehorned
19	Mod. Deadwood (30-60% Canopy Dead)
20	Shallow or exposed roots
21	Moderate Trunk Decay
22	Significant Trunk Decay or Hollow
24	Sign. Deadwood (>60% Canopy Dead)
25	Chlorosis or Nutrient Deficiency
27	Girdling Roots

City of Norman, Oklahoma : Tree Inventory and Assessment Prepared By: Dr. Thomas Hennessey, Ph.D.

Results

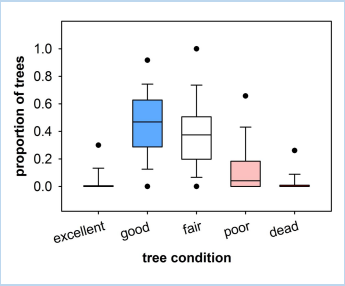
Photo credit: Jack Friedman

Urban Tree Mortality

- Newly planted tree mortality averaged 40% in first two years.
- Priority = planting > maintenance

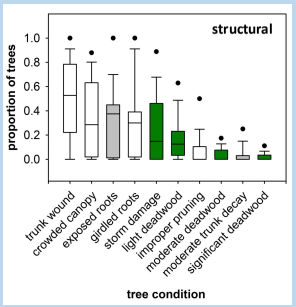
Urban Tree Health

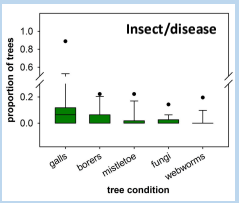
Overall condition



Most trees are in good to fair condition

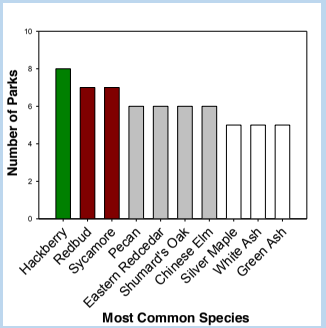
Condition issues





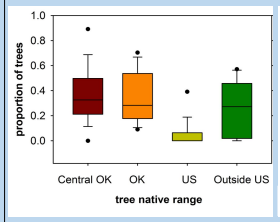
Human induced damages occur much more frequently than natural damages

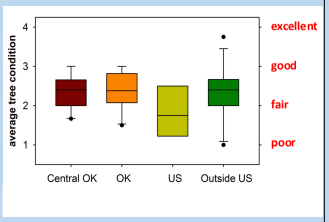
Most common species



9 out of 10 of the most common species are native to central OK. Chinese elm is exotic to the U.S.

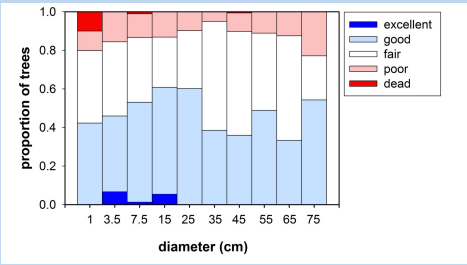
Is health related to native status?





There is no difference in health between trees native to Oklahoma and those native to areas outside Oklahoma.

Is there a health difference due to size?



The smallest and largest trees are least healthy.

Summary

- Mortality of 40% within the first two years after planting represents a substantial loss of green infrastructure investment.
- Human induced damage was more commonly observed than storm damage or canopy dieback.
- Trees native to central Oklahoma were not in better condition than trees native to other regions.
- **Overall, human stressors, rather than improper species selection, appear to be the biggest factor in poor tree health.**

Future Directions

It is important to continue to assess health conditions and mortality rates for new and previously surveyed areas. Refining native status classifications to represent environmental (instead of geographical) conditions in the native range, as well as incorporating socio-economic and land history information, may give insight into high variability observed across parks. We also plan to combine our data with spatial data on access to green spaces, to assess the quality of green spaces that people have access to in the OKC metro region.

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