

Tree Composition and Seedling Recruitment in Urban and Rural Forests

Robin Fahy, Wes Hanson, and Nancy Broshot
Linfield College Environmental Studies

Background Information

- In 1993, 24 permanent sites were randomly located in Forest Park; an additional site was in the Ancient Forest Preserve (Old Growth)
- The purpose of the original study was to examine the effects of urbanization on forest structure
- Trees were identified to species and dbh measured
- In 2003 and 2013, measurements were repeated
- In 2014, 3 control sites in the Mount Hood National Forest (above Estacada Or.) were added
- In 2003 and 2013, there were significantly fewer live trees and significantly fewer seedlings (trees <10cm dbh) than in 1993; this was true for all sizes except very large trees and for all species of trees
- The high tree mortality and lack of recruitment is similar to findings in other urban forests
- This poster compares tree density between Forest Park sites and the control sites in the Mount Hood National Forest

Goals of Study

- Establish control sites in a rural area to examine the impact of air quality on trees and recruitment
- Gather baseline tree data at each control site
- Compare tree density between control and long term study sites in Forest Park

Hypothesis

- Tree recruitment (# seedlings and saplings) would be greater at control sites than in urban sites

Acknowledgements

This study was funded through the Faculty-Student Summer Collaborative Research Grant from Linfield College with additional assistance from Portland Parks and Recreation

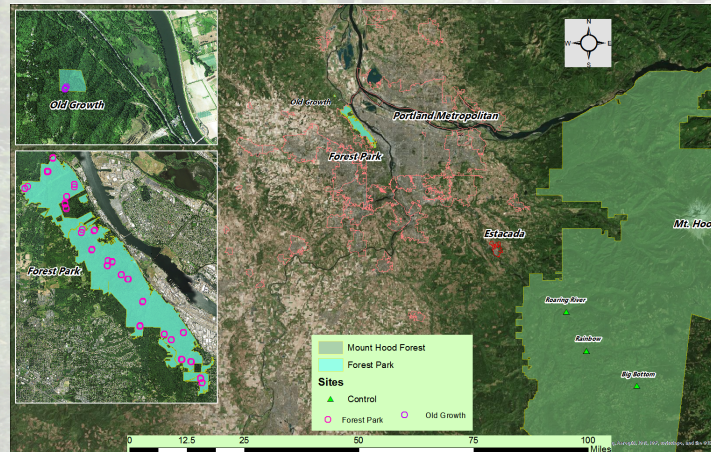


Figure 1. Locations of sites in Forest Park and the Ancient Forest Preserve in Portland, Oregon; and the three control sites above Estacada, Oregon relative to Portland.

Methods

- 24 random sites were selected in Forest Park in 1993 along the urban-rural gradient; 1 site in the Ancient Forest Preserve
- Three, 250 m² quadrats were randomly located at each site to measure trees
- All trees within each quadrat were identified to species and dbh (diameter at breast height) of each tree measured.
- Sites were relocated in 2003 and 2013 and measurements repeated
- In 2014 three control sites were selected in the Mount Hood National Forest along a perceived gradient of air quality
- Trees were measured in three quadrats/transects in the same manner as in Forest Park

Results

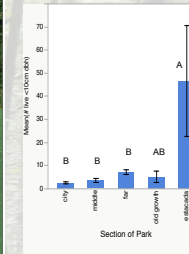


Figure 2. Mean number of live trees (SE) by location

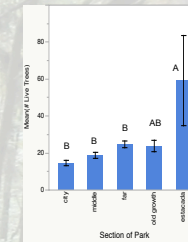


Figure 3. Mean number of live saplings (trees <10cm dbh) (SE) by location

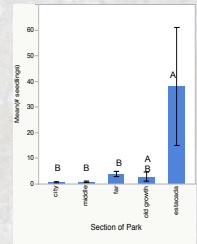


Figure 4. Mean number of live seedlings (trees <2m in height) (SE) by location

- We found significantly more live trees, saplings (trees <10cm dbh) and seedlings (trees <2m tall) at the control sites than at sites in Forest Park
- We had more seedlings at the three control sites (341) than at all 25 of the Forest Park sites combined (140)

Conclusions

- Forest Park, like many urban forests, is experiencing low levels of seedling and sapling recruitment
- The control sites had significantly higher numbers of saplings (<10cm dbh) and seedling than sites in Forest Park
- We believe the lack of tree recruitment observed in Forest Park may be due to nitrogenous air pollution levels in the urban forest
- We have data on lichens and are waiting for data on levels of NO_x in the air at each site, as well as soil analysis for total N and C to further investigate air quality