

Climate Change and Urban Forests



Project Summary

Washington State faces climate change impacts that include sea level rise, temperature increases and changes in precipitation. The conservation and restoration of urban forests becomes increasingly important in addressing these changes by mitigating storm water impacts from increased precipitation, reducing temperatures, and sequestering carbon.

Limited information is available to guide decisions on species selection for urban forest restoration, seed source selection and other management practices. The Green City Partnerships, with support from the US Forest Service, partnered with the University of Washington's College of the Environment to create models to inform reforestation and restoration management strategies. Download the full report at http://www.forterra.org/what_we_do/build_community/green_cities/green_cities_research

Reference:

Kim, S., Uran C., Lawler J., and Anderson R. September 2012. *Assessing the Impacts of Climate Change on Urban Forests in the Puget Sound Region: Climate Suitability Analysis for Tree Species.*

Additional Resources:

- Washington State Seed Transfer Zones - www.dnr.wa.gov search "tree seed transfer zones"
- Washington State University Extension - www.extension.org search "climate change adaption for forests"
- Seedlot Selection Tool - sst.forestry.oregstate.edu/pnw/

Tools for predicting the success of tree planting in urban forest restoration

Climate Envelope Models are used to predict the distribution of species under current, past, and future climatic conditions. The models use current species distributions to construct an idea of the climatic conditions that support the growth and success of these species. This 'envelope' can then be used to see where species could live under future climate scenarios.

Seed Transfer Zones are geographic regions where plant materials can be moved without jeopardizing the plant's ability to grow and thrive. The zones are based on environmental conditions, genetics, and topography. Since genetic differences exist among plant populations due in part to environmental influences, knowing the origin of a seed is important in determining where it will grow successfully. Seed transfer zone maps have been used for decades in commercial forestry and are important tools for urban forest restoration as well.



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Research Findings

Habitat suitability and seed transfer zones of three tree species commonly used in urban forest restoration, including western redcedar, Douglas-fir, and western hemlock, were assessed using bioclimatic envelope modeling. Results suggest that:

- The current **habitat conditions** suitable for western redcedar, western hemlock, and Douglas-fir are likely to remain appropriate through the end of this century. This is likely because the distribution of these species as a whole spans greater than the Puget Sound or Washington State boundaries and most areas in the state remain within the climate “envelope” suitable for these species.
- Climate conditions that make up the current **seed transfer zones** of western redcedar, western hemlock and Douglas-fir are likely to change radically within western Washington or, in some cases, nearly disappear towards the end of the century.

Implications

- For restoration purposes, practitioners may need to use seeds from diverse sources - not only from current seed transfer zones - for successful tree establishment.
- Using seeds from adjacent areas, where future seed zones match current conditions, could ensure successful tree establishment under shifting climate conditions.



Western redcedar Seed Transfer Zone Model for Puget Sound

The maps to the right represent twelve future climate scenarios. The darker colors mean that more of the future climate scenarios have the same climate conditions as the current seed zone.

Results suggest that seed sources for western redcedar establishment will shift dramatically northwest over the next several decades and nearly disappear by 2080.

