Trees and Minot Historical Flood

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Introduction

Like any living being trees must adapt to traumatic happenings they may experience in their lifetime. For a tree, a flood has a significant impact on how it lives, it damages its light gathering leaves, the soil its roots dig into, and the entire environment it resides within. In our area however, due to a lack of research it is hard to understand why some trees die and others survive or are able to regenerate themselves after a flood. By surveying trees in the Minot flood area we are able to grasp a better understanding of how trees adapt to, and behave during flood rehabilitation. The damage inflicted to a tree during flooding can be traced back and noted hundreds of years after the disaster. By understanding the damage of trees we can improve their ability to survive a flood by planning which species to plant in areas more susceptible to flooding.

Materials and methods

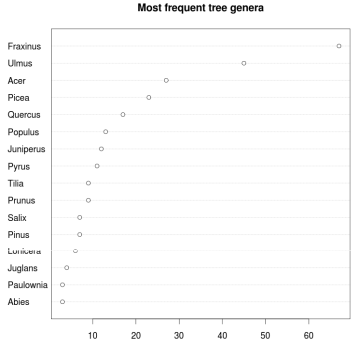
Plants were sampled in residence area (University Avenue) and two city parks (northeast Oak Park and southwest Roosevelt Park). In all, 282 trees were sampled. We determined species of every tree using Herman & Chaput guide (2003) and also photographed and collected leaf/twig samples in difficult cases. For every tree, the height and flood damage score were estimated:

0 No damage
1 Less than 25% of the tree is damaged
2 25%-50% of damage
3 50%-75% of damage
4 75%-99% of damage
5 100% of damage (dead tree)

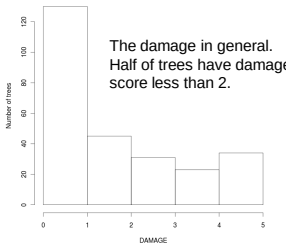
In addition, we estimated the maximal level of flood on the tree location. This may be done, e.g., by tracing the property damage.
The second part of research was dedicated for better understanding the dependence between the level of water and tree damage. We made a virtual transect along the 8th Street (which come almost as a perpendicular from river to the undamaged part of city) and use apple trees (*Pyrus* spp.) as an indicator of damage.

Results and conclusions

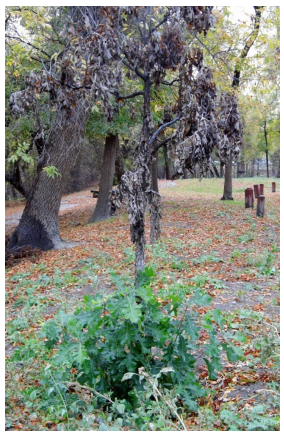
All results are graphically represented below



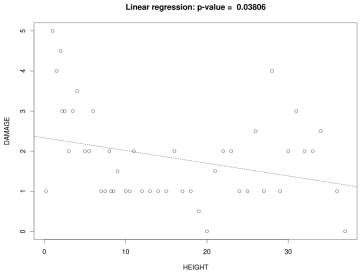
Counts of trees sampled. Ashes (*Fraxinus*) and elms (*Ulmus*) are dominated in Minot.



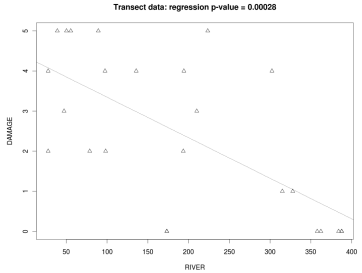
The damage in general. Half of trees have damage score less than 2.



The "new hope": root-borne twigs of oak (*Quercus*)

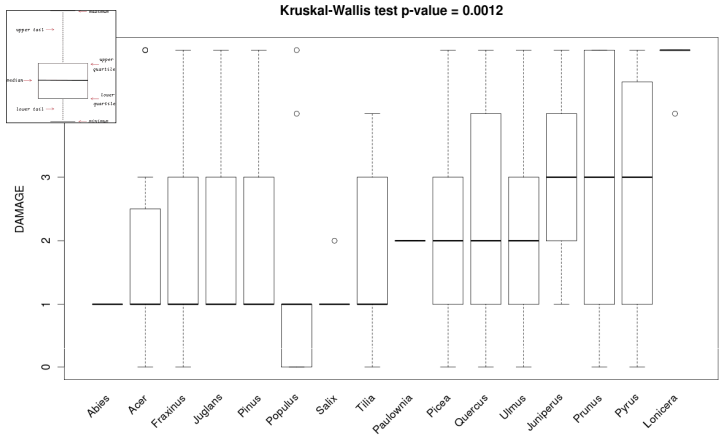


There is a statistically significant relation between tree height and the level of damage: bigger trees are less susceptible to the flood. However, this situation may change after 2011/2012 winter.



Even stronger is a dependence of a damage on the distance from river along the 8th Street transect.

Dead (damage score = 5) and alive (damage score = 0) apple (*Pyrus*) trees along the 8th Street.



Box-and-whiskers plots (see figure 9 for the explanations) for the itemized damage levels. Rosaceae (rose family) trees (like *Pyrus*, apple and *Prunus*, cherry) and junipers are most damaged; spruces (*Picea*), oaks (*Quercus*), elms (*Ulmus*) are also suffering from flood. Since result is statistically supported, we may now provide a recommendation NOT to use these trees for vegetation restoration in flooded areas. Instead, we recommend to use maples (*Acer*), ashes (*Fraxinus*) and other trees which are suffered less. Generally, our results are in the agreement with previous investigations (see References). It should be mentioned, however, that our region is almost non-researched.

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