

## **Tornado Impacts on Upland and Bottomland Forests**

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In the fall of 2002 a tornado caused ecosystem altering damage to Sycamore Land Trust property north of Bloomington. The extent of the tornado damage in forested areas is the focus of this research project. Three plots of forested land affected by the tornado were chosen as study sites. Two sites are located on a North-facing slope of an upland forest because of the large extent of damage in this area. One site is located in a flat, bottomland forest. The same data was collected by a field techniques course on a South-facing slope in the upland forest and is used for comparison with our research.

Through statistical analysis we compared the damage in the upland and bottomland forests (Curtis), and also between the North- and South-facing slopes of the upland forest (Brown). The data recorded include: species; diameter at breast height (DBH); height; damage status (intact, broken, uprooted); and shade tolerance. The North- and South-facing slopes of the upland forest have a different species composition. In the Northern hemisphere South-facing slopes receive more sunlight creating different growing conditions that favor shade intolerant species. Differences in species composition resulted in differences in tornado impact. Certain tree species are more vulnerable to damage due to diameter, height, and strength characteristics.

The upland and bottomland forests also have different species composition. The bottomland forest is a forested wetland. Because of the harsh living conditions, few tree species are able to thrive in this waterlogged soil. The topography of the woodland is very flat, so the tornado damage here is much more uniform than the damage to the slopes of the upland forest. This also yields differences in tornado damage.

Total height, diameter, and strata position in the forest were factors in the damage status of the trees. It became apparent that trees of greater heights and diameters were more likely to be damaged during the tornado. This data can also be correlated with the shade tolerance of different tree species. Shade-intolerant trees tend to grow in the canopy and have greater heights than shade-tolerant trees.

Damage status of the trees following the tornado allows us to forecast future forest composition as new trees begin to grow. The succession of the damaged forest depends on: the tree species indigenous to the area; the shade tolerance of the remaining intact trees; and the shade tolerance of the new saplings. The composition of the upcoming forest affects wildlife as well. Mast production and habitat provided by different species changes with succession altering the wildlife present.

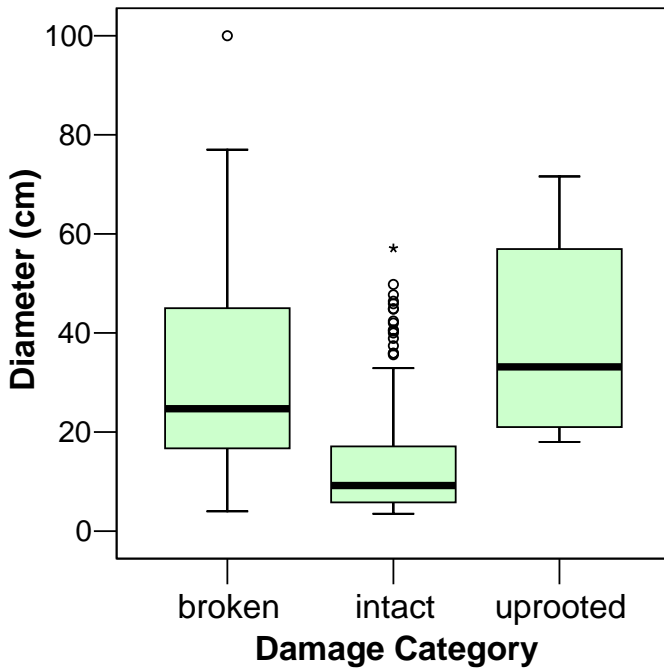


Figure 1. Diameter at breast height of the trees in the upland forest versus the damage category. The intact trees have a significantly smaller DBH than broken or uprooted trees.

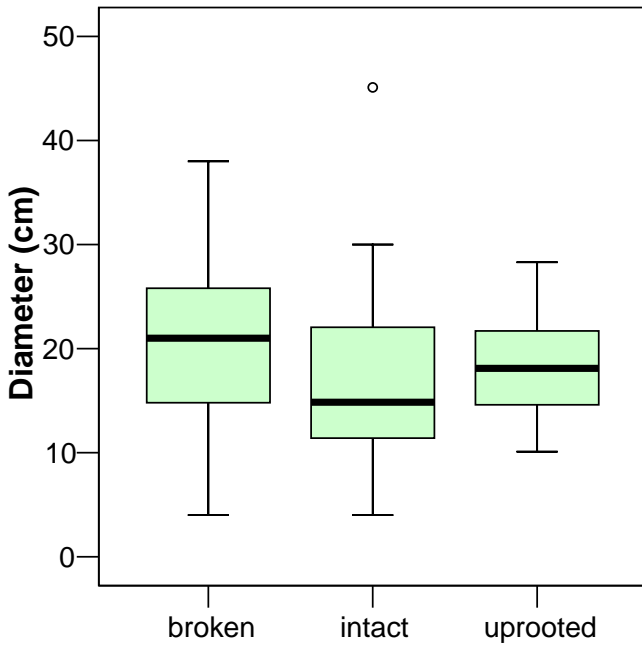


Figure 2. Diameter at breast height of the trees in the bottomland forest versus the damage category. The intact trees have a slightly smaller DBH than broken or uprooted trees.