



# Trees in Urban Streetscapes: Research on Traffic Safety and Crash Risk

Trees are highly valued by many people in U.S. cities and towns. Community values about trees can be incorporated into transportation planning for new and expanded roads. However, it is important to realize that trees are fixed objects in the roadside, and drivers who run off the road can collide with them, potentially resulting in injury or death. Communities must weigh the pros and cons of having roadside trees. Good information about safety and crash risks is important to the decision-making process. This study evaluated the safety risk of

urban roadside trees using U.S. national crash data. While road and traffic conditions vary from state to state and place to place, this research provides preliminary information about trees and traffic safety, to inform discussions between transportation planners and community stakeholders.



## Trees are More than Aesthetics . . . .

Trees may be considered expendable in the face of safety concerns. Yet scientific studies prove that trees provide many benefits. Environmental services include stormwater reductions, reduced urban heat island effects, lower levels of air pollution, and lower energy costs for buildings. Trees also affect local economics as desk workers who see nature report increased productivity, landscaped residential and commercial real estate values are higher, and shoppers report that they are willing to pay more for goods in business districts having trees. Regarding transportation, drivers highly prefer seeing trees in the roadside, and views of nature while driving contribute to lower stress response in drivers.

## Research Project

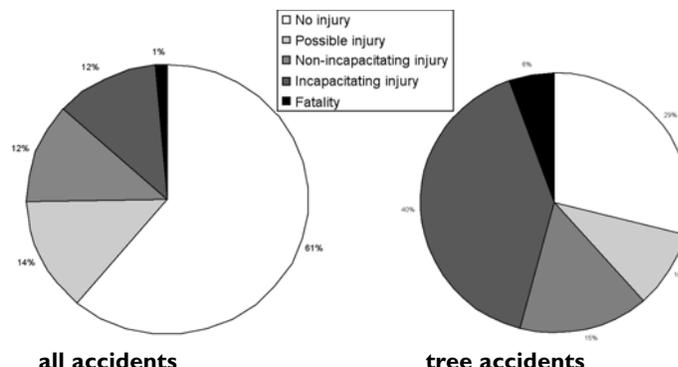
Using archived national transportation crash data, a progression of statistical analyses was done to better understand the relationships between trees and safety in urban transportation corridors. Year 2002 data from the National Automotive Sampling System (NASS) of the General Estimates System (GES) database were used. These data are sampled and collected by the national statistics center of the NHTSA (National Highway Transportation Safety Administration) in order to identify traffic safety problems and analyze traffic programs. The research started with descriptive statistics of 91 relevant variables, followed by comparative analyses of pairs or clusters of variables, and finally predictive modeling to provide information for future roadside planning. Major findings are reported here.

## Numbers of Traffic Crashes in the U.S.

About 6,316,000 crashes were reported in 2002, and occurred on all road types - freeways, arterials and local roads. 79% of all crashes are car versus car collisions, and 4% are rollovers. Trees are involved in 1.9% of crashes, or about 120,000 per year. How do these numbers compare to U.S. travel patterns? Annual total vehicle trips (in 2001) totaled 233 billion (about 6 trips per day per household). Tree crashes occur in about 1 in every 1.9 million vehicle trips.

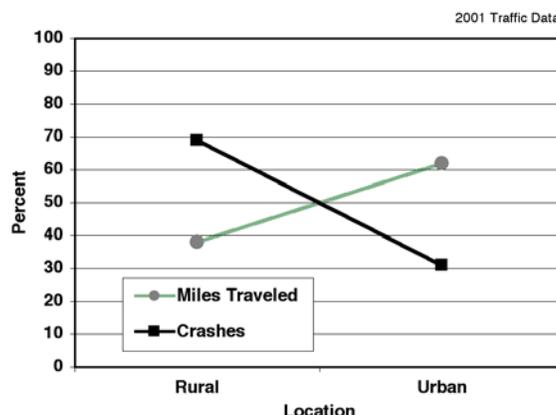
### Crashes and Injury

For all crashes 1% result in fatality, and 12% cause incapacitating injury. Collisions with trees are more injurious; 6% of tree crashes result in fatality and 40% result in incapacitating injuries. The chance of injury increases from 25% for all crashes to 71% for trees. Why is the injury rate higher? Vehicle speed for tree collisions averages 52 MPH while the mean speed for all crashes is 34 MPH. Trees don't breakaway (as do poles and lights); the physics of impact are more severe.



### Tree Crashes in Cities

Higher impact speeds and injury rates probably reflect the preponderance of tree collisions in rural areas. 61% of tree crashes occur in rural areas and 39% in urban. The ratio of annual vehicle miles traveled is reversed; 62% of vehicle travel miles (2.86 trillion in 2002) are urban, while 38% are rural. Thus, there is a greater ratio of crashes per miles traveled in rural areas than in urban areas. This is an important finding. The U.S. has increasingly become more urbanized. Better data about urban conditions is needed to improve roadside design guidelines in that context.



New roads and road improvements construction are major capital investments. Often communities are interested in investing in green infrastructure as well as grey infrastructure. More information is needed to better integrate trees into the planning and design of urban roadsides:

- improved risk analysis of tree crashes based on urban conditions & urban design standards
- expanded information about how to mitigate tree risks using roadside design
- research on “trees as technology” to understand how different vegetation species and landscape arrangements may lessen injury on vehicle impact



#### Research Funding:

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#### For more information, contact...

PROJECT DIRECTOR: Kathleen L. Wolf, Ph.D.; College of Forest Resources, University of Washington

PHONE: (206) 616-5758, E-MAIL: [kwolf@u.washington.edu](mailto:kwolf@u.washington.edu)

WEB SITE: [www.cfr.washington.edu/research.envmind](http://www.cfr.washington.edu/research.envmind)