

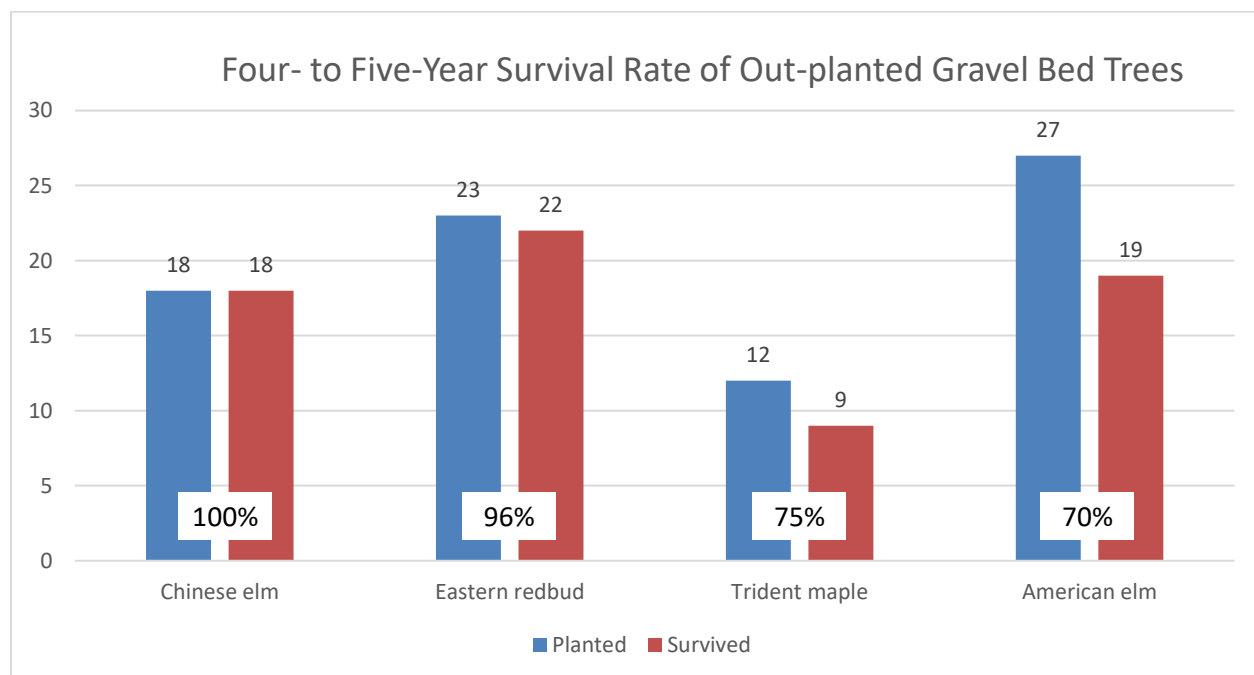
# Technical Notes

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**Subject:** Gravel Bed Tree Planting Series – Survival Data

**Executive Summary:** In the South, trees grown in gravel beds can be out-planted as bare-root trees at any time of the year with a high probability of survival. Of the 80 trees out-planted from a gravel bed in Athens, GA, 85 percent survived the first five years. Some species did better than others. Chinese elm (*Ulmus parvifolia* ‘Bosque’) and eastern redbud (*Cercis canadensis*) had 100 percent and 96 percent survivability, respectively, while trident maple (*Acer buergerianum* ‘Aeryn’) and American elm (*Ulmus americana* ‘Princeton’) had survival rates of 75 percent and 70 percent, respectively. Vandalism, improper landscape maintenance practices, and animal interaction appeared to be the major causes of mortality.

**Brief Report:** Between August 2011 and February 2013, 80 trees of four separate species were transplanted from a gravel bed in Athens, GA, to various locations on public property around the city. Subsets of trees were planted in August 2011 (18 trees), February 2012 (16), May 2012 (13), and February 2013 (33). Athens/Clarke County landscape personnel properly planted, staked, mulched, and watered all trees. Tree metrics and condition were recorded at time of planting and during the dormant season through the 2016 growing season. All of the 18 ‘Bosque’ Chinese elm survived through the 2016 growing season. Only one of the 23 eastern redbud trees did not live through 2016. Nine of the 12 ‘Aeryn’ trident maple and 19 of the 27 ‘Princeton’ American elm survived through 2016. In all, 68 of the 80 trees out-planted survived four to five growing seasons.



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## Probable Causes of Mortality

The trees were planted in parks, public rights-of-way, and publicly-owned institutional properties and maintained by county maintenance crews. Annual tree condition assessments provided a good indication of cause for removal. Of the 12 trees that did not survive, assessment notes indicated that deer rubbing on stems, broken stems due to vandalism, and lawn maintenance equipment damage caused the majority of problems. Personal communication from county maintenance crews also indicated that several newly planted trees were simply removed from their planting site soon after being planted, presumably to be transplanted elsewhere by citizens.

The highest mortality occurred in a high traffic park where six of the nine ‘Princeton’ elm trees planted disappeared by year five. The trees were planted in open areas of the park where there was a lot of activity, and stems were regularly found to be broken or severely rubbed by deer (fig. 1). Because bare-root trees tend to be smaller in diameter at time of planting, they may be susceptible to vandalism, especially in areas with high human activity. Time of year out-planted did not seem to have a negative impact on survivability; trees planted in August 2011, May 2012, and January 2013 had 89 percent, 92 percent, and 91 percent survival rates, respectively. Trees planted in February 2012 had 63 percent survivability, but this was due to the disappearance of the six ‘Princeton’ elms planted in a high traffic park mentioned above.



Figure 1—Deer rubbing damage on ‘Princeton’ elm stem.

## Mortality Prevention Techniques

Several actions can be taken to increase the survivability of bare-root trees:

- Protect roots from drying out during transport and the planting process;
- Maintain adequate mulch layers around trees to encourage growth and vitality;
- To prevent vandalism, plant trees in areas of low human activity;
- Involve neighbors in tree planting activities to help discourage theft and vandalism;
- Use protective plastic tubing around the base of stems to protect from damage by lawn equipment; and
- Use creative staking techniques to prevent deer from accessing small stems.

## Conclusions

Using a gravel bed as a method to grow bare-root trees enables municipalities with a small tree planting budget to increase the number of trees planted annually for a fraction of the cost of using larger trees while increasing survivability of their planted trees. When planning where to plant bare-root trees, consider the level and type of activity. In areas with high activity such as sport complexes, dog parks, or school yards, it may be best to plant larger trees to limit vandalism.