An Evaluation of Urban Live Oaks In Gulfport, Mississippi Including One Very Unfortunate Event

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Healthy live oak in Gulfport, MS. October, 2003

Hurricane Katrina approaching the Louisiana-Mississippi coast. August, 2005

The same oak after hurricane Katrina. October, 2006

INTRODUCTION

Concern over the health and appearance of street and urban trees (particularly live oaks, *Quercus virginiana* Mill) in Gulfport, Mississippi in recent years resulted in a baseline urban tree inventory of the city. The inventory was completed during the summer of 2001 by graduate students and staff of the Urban Forestry Program at Southern University, Baton Rouge, Louisiana. They estimated that 63% of the street and urban tree population was comprised of live oaks and that about 25% of the live oaks were in a declining condition. Decline was evidenced by crown dieback, reduced foliar density and various injuries. The exact cause(s) of the decline for each of these trees was beyond the scope of the inventory. Because of that and concerns that serious, undiagnosed diseases may be present, a follow-up survey was performed in October, 2003 by U.S. Forest Service specialists in an effort to determine the cause(s) of decline in the affected trees.

METHODS

In order to categorize cause(s) of street and urban tree decline, this study compared tree and growing space conditions for pairs of nearby declining versus healthy live oaks. An street and urban tree survey was made of live oaks on every other north-south and east-west street (approximating a 50% survey) in the older section of Gulfport in October, 2003. Most live oaks were concentrated in this area as determined by the previous inventory. Crews of two drove selected streets in one or both directions as necessary viewing all the live oaks (when parks, schools, or other public properties were encountered, they were surveyed in their entirety). Every live oak tree in a declining condition (estimated dieback ≥15% of the crown and/or crown density ≤40%) was identified for data collection along with the nearest healthy (non-declining) live oak of similar size. Therefore, the sample group consisted of an equal number (24) of declining and healthy trees. Data collected on each tree conformed substantially to the Urban Forest Effects Model (UFORE; Nowak et al. 2001) and included the crown variables of density, dieback, and foliage transparency as used in the Forest Health Monitoring Program. Results from this initial evaluation indicated that declining trees had lower crown densities, higher crown dieback, and higher foliage transparencies (figure 1). They were also associated more frequently with public and commercial land uses, and with greater amounts of hard or impermeable ground cover. In addition, no evidence was found of potentially serious tree killing diseases of oaks such as oak wilt or sudden oak death (Starkey et al. 2005). The unfortunate landfall of hurricane Katrina in August, 2005 provided an unusual opportunity to revisit these trees and evaluate the change in crown conditions after a major storm event. This was done in October, 2006, 3 years after the initial evaluation and slightly more than one year after hurricane Katrina.

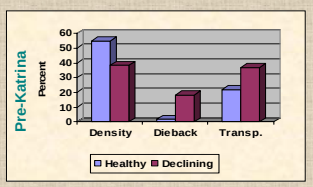

Figure 1.—Crown density, dieback and foliage transparency; Pre-Katrina, October, 2003

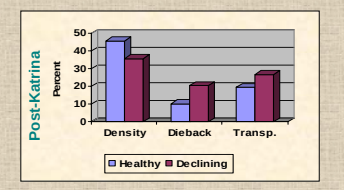

Figure 2.—Crown density, dieback and foliage transparency; Post-Katrina, October, 2006

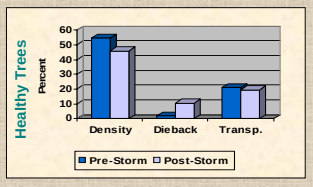

Figure 3.—Crown density, dieback and foliage transparency of healthy trees.

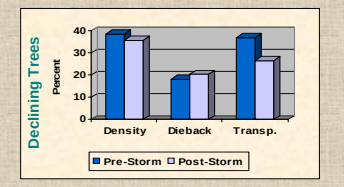

Figure 4.—Crown density, dieback and foliage transparency of declining trees.

RESULTS

Most trees survived the hurricane but a few were lost due to the storm or post-storm removals. Therefore, the sample population in 2006 consisted of 22 declining and 23 healthy trees. Storm damage was highly variable ranging from main stem breakage to minimal crown thinning. Damage was generally dependent on the distance from the beach. Trees in the first few blocks near the beach sustained the most severe damage while trees farther inland sustained less. The storm blew away fine twig dieback, parts or all of individual branches, and much of the foliage. However, by the time of this evaluation abundant new sprouts and foliage, closely clustered to remaining twigs and branches, was present. As before the storm, declining trees had lower crown densities, higher crown dieback, and higher foliage transparencies than healthy trees (figures 1 and 2). But the differences in crown ratings between the declining and healthy populations were not magnified by the storm; in fact, differences were decreased (figures 1 and 2). Both populations experienced reductions in crown density, increases in dieback, and decreases in foliage transparency (figures 3 and 4). Density ratings probably didn't decrease as much as might be anticipated due to the storm's effect of reducing the overall crown size. Also, some trees had received some pruning by this time to reduce hazards due to broken and dead branches and stems. The higher dieback ratings were mostly a result of small twigs and branches that didn't re-foliate. Lower foliage transparency ratings resulted from the heavy re-sprouting along limbs. Before and after photos of several trees and their location on a city map are presented at right in figures 5-9 and in the poster title.

CONCLUSIONS

While the crown ratings before and after the storm generally reflected the overall change in crown conditions, we were surprised that the differences were so small. Overall, the storm tended to shrink the crowns in size and left them less dense. But heavy re-sprouting resulted in dense foliage masses appearing along surviving limbs giving lower foliage transparency. Our crown ratings may have been less precise and consistent than they could have been. We had variability in crews – in the original evaluation we had 3 crews of 2 and in the re-evaluation, a single crew of 3; also, several crew members had only brief training and limited experience with the system before it was applied. The crown ratings may have evidenced greater change had our crews been consistent and more experienced. We expect most of these trees to substantially re-build their crowns in the next 3-5 years, ameliorating much of Katrina's damage.

LITERATURE CITATIONS

Nowak, D.J.; Crane, D.E.; Stephens, J.C. 2001. The urban forest effects (UFORE) model: field data collection procedures. Syracuse, N.Y.: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 114p.

Starkey, D.A.; Leininger, T.D.; Oak, S.W.; Jones, W.E.; Kertz, R.C.; Corbin, K. 2006. Health of live oaks in Gulfport, Mississippi, October, 2003. Report 2006-02-06. Pineville, LA: U.S. Department of Agriculture, Forest Service, Southern Region, Forest Health Protection, Alexandria Field Office. 12p.

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Figure 5.—Declining tree (#19) before and after.

Figure 6.—Declining tree (#15) before and after.

Figure 7.—Healthy tree (#14) before and after.

Figure 8.—Healthy tree (#34) before and after.

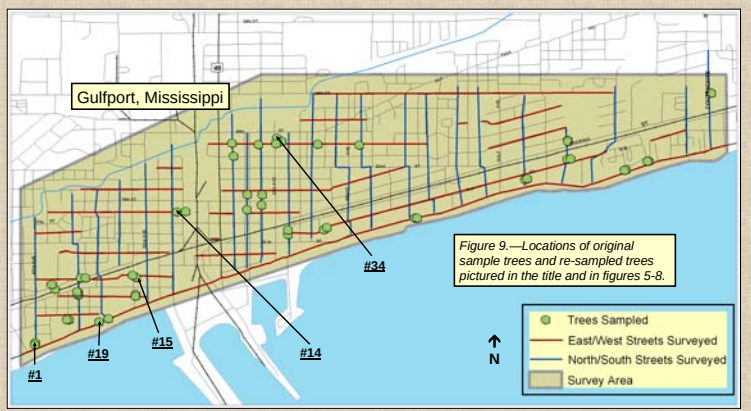

Figure 9.—Locations of original sample trees and re-sampled trees pictured in the title and in figures 5-8.