

FROM THE BRONX TO BIRMINGHAM:

IMPACT OF CHESTNUT BLIGHT AND MANAGEMENT PRACTICES ON FOREST HEALTH RISKS IN THE SOUTHERN APPALACHIAN MOUNTAINS

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Southern Appalachian forest landscapes evoke images of the primeval forest in many people today. Indeed, most vegetation components in these forests have been present in varying mixtures and distributions for at least 58 million years (Delcourt and Delcourt 1981). However, the only thing constant about these landscapes has been change. Advancing and retreating ice sheets, drought, flood, wind, and fire all served to shape forest composition and structure. Irrepressible as these forces are, people have been perhaps the most important change agents since arriving in the region at least 9,000 years ago (DeVivo 1991, Hudson and Tesser 1993). In this context, the types and sequence of human-influenced disturbances since the middle of the 19th century have resulted in Southern Appalachian forests that bear little resemblance in terms of composition and structure to any that have existed in the past. These disturbances include the widespread use of fire, first by native people and then by European settlers; land clearing and agriculture followed by abandonment of marginally productive lands; widespread and sometimes abusive logging to supply fuel and building materials to a growing nation; industrialization and concurrent urbanization; and the implementation of aggressive fire suppression.

Perhaps the most profound ecological disturbance of all occurred with the introduction to North America and spread of *Cryphonectria parasitica* (Murrill) Barr, the fungus pathogen that causes chestnut blight. It caused unequalled impacts in eastern hardwood forests generally, and the Southern Appalachians specifically, that are still manifest today. American chestnut (*Castanea dentata* [Marsh.] Borkh.) was the most important hardwood tree in Southern Appalachian forests. Estimates of composition at large regional scales ranged from 25 to 50 percent (Ashe 1911, Buttrick 1925). Originating in Asia, the chestnut blight pathogen was first detected in the Bronx, New York in 1904. The pathogen spread rapidly, since native chestnuts lacked co-evolved disease resistance. By 1940,

chestnut blight had killed 50 to 99 percent of the American chestnuts throughout its botanical range. The tree persists today as sprout growth from residual root systems but usually attains diameters of only a few inches and rarely flowers before succumbing again.

The history of past disturbances, especially repeated light ground fire followed by nearly complete fire suppression, set the stage for the new forest that succeeded the blight-killed chestnut forest. Native people and European settlers alike had used this type of fire regime to reduce rank understory vegetation and promote browse for game. Aggressive sprouters like American chestnut and the oaks have a relative advantage over other tree species under this fire regime, and built up large reproduction reserves in the understory. As chestnuts died and aggressive fire suppression was implemented, newly available growing space was quickly occupied by these species already positioned in the mid- and understory. While chestnut replacement was variable, oak species (*Quercus prinus* L., *Q. rubra* L. and *Q. velutina* Lam., in particular) typically increased (Korstian and Stickel 1927).

These changes occurred over a very short time span on millions of acres in the Southern Appalachian Mountains. State-federal cooperative fire control programs, public land acquisition to form national forests and parks, and lower rates of harvest compared to previous levels resulted in oak forests which have aged relatively free of disturbance for 70 to 90 years. These forests are contrasted with those found around the time of European settlement in Table 1. Current characteristics make them vulnerable to a stress-mediated disease known as oak decline, which is affecting landscapes throughout the Southern Appalachians. The disease is both an indicator of and a contributor to compromised ecosystem health.

Table 1. Comparison of Southern Appalachian forest composition: structure, disturbance characteristics, and values perspective; pre-1900 vs. current.

PRE-1900	CURRENT
Composition American Chestnut	Composition Oak
Relatively Young and More Complex Age Structure	Cohorts 80-100 Years Old
Sparse Understory	Dense Understory
Widely Spaced, Large Diameter Overstory	Dense, Small Diameter Overstory
High Disturbance (Fire, Farming, Logging)	Low Disturbance (Fire Suppression)
Small, Dispersed Human Population	Large, Urbanized Human Population
Forest Utilization Perspective	Ecosystem Protection Perspective

