American Chestnut Survival Study

American Chestnut (Castanea dentata), photo courtesy of TACF

During 2012 and 2013, BRMC joined The American Chestnut Foundation and the Smithsonian Conservation Biology Institute in conducting a study to measure survival rates of American Chestnuts under various environmental conditions.

SCBI's American Chestnut Study Final Report (click to open pdf in new window)

Goals

The purpose of the study was to gather survival rate data to use in creating a restoration plan for re-introducing the American chestnut to the Appalachians.

American Chestnut (Castanea dentata), photo courtesy of TACF

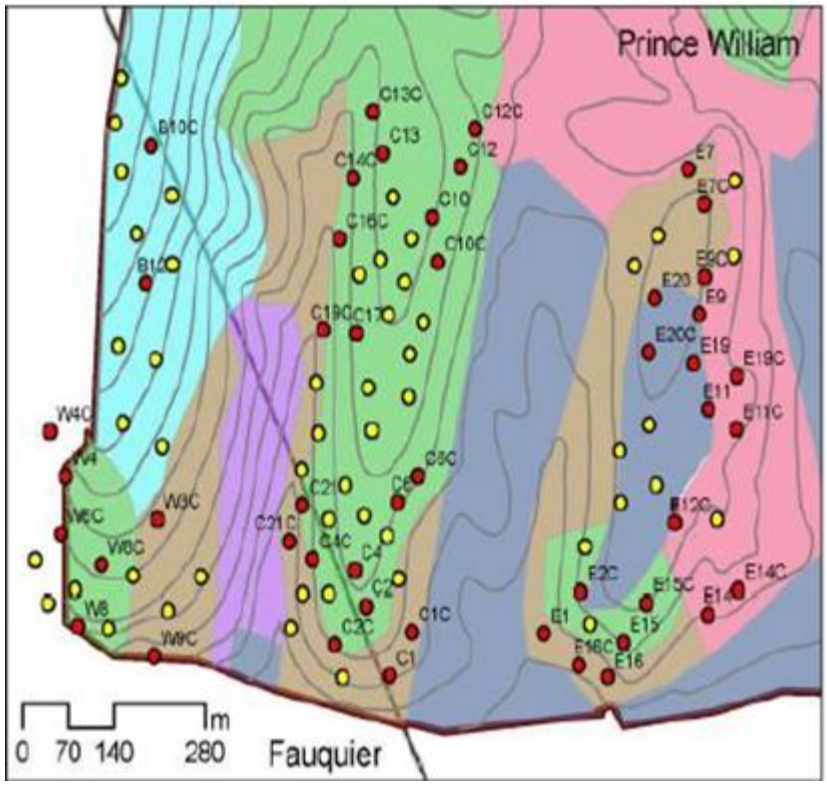
American chestnuts used to be one of the dominant tree species in the Appalachians, but in the early 1900s a blight was accidentally introduced and quickly spread across the east coast, wiping out the chestnuts. TACF has worked to develop an Asian/American hybrid tree, one that closely resembles the pure American species but also carries the blight resistance characteristics of the Asian species. With hybrids in the process of development, obtaining survival rate data was the next step in the restoration process.

Methods

To have realistic expectations of survival and to discover the best ways to plant in order to maximize survival rates is a fundamental aspect of the restoration process. The BRMNAP study used a variety of approaches to analyze which chestnuts did best. In total, 150 study

plots were designated, with half the plots located in closed canopy (shaded woods) and the other half located in canopy gaps where sunlight was plentiful. At each site, half of the seeds were protected either with wire fencing or slash (an assembly of sticks), and the other half were left as unprotected controls. Every two weeks BRMC volunteers and staff from the SCBI hiked across the BRMNAP to their respective plots to monitor seed growth.

Results



Distribution of study sites across the BRMNAP.

Germination rates were very low—mostly due to rodents digging up and eating the seeds. Only 6% of total seeds planted actually germinated, but after a successful germination, 62% of these made it through to the end of the study in October of 2013. Due to the high seed mortality in 2012, one-year seedlings had been planted in November in advance of the 2013 field season. Surprisingly, open vs. closed canopy made no notable difference on the seedlings, with seedlings at both locations more or less consistent with each other. Seedlings protected from deer browse, however, either by slash piles or fencing, were twice as likely to survive. Fenced seedlings did substantially better than slash, possibly due to the slash piles blocking a considerable amount of sunlight, thus stunting growth. This was apparent as fenced seedlings were on average 65% taller than their slash counterparts.

In analysis, it was concluded that re-forestation should not begin with seed planting, due to the dismal 6% germination rate. While the sustainability of the introduced tree will depend on the natural seed process, “this will result from mature trees each producing many thousands of seeds and not volunteer corps planting hundreds of seeds” (McShea, 2014). Despite the slower growth rate of slash-protected seeds, because of the added cost and maintenance of fencing, it was recommended to use slash in restoration, as in the long term initial discrepancies would have little impact.

Sources

McShea, William & Bourg, Norm. “Bull Run Mountains American Chestnut Survival Study: Summary”. Smithsonian Conservation Biology Institute. 2014.

Site Layout and Plot Sites images from “Bull Run Mountains American Chestnut Survival Study: Summary”