

PIONEER MOTHERS' MEMORIAL FOREST REVISITED

Richard C. Schlesinger, David T. Funk, Paul L. Roth, and Charles C. Myers¹

Abstract: The area now known as Pioneer Mothers' Memorial Forest was acquired by Joseph Cox in 1816 from the public domain. In 1944, a portion of that property, including the area referred to as Cox Woods, was established as a National Forest Research Natural Area. This beech-maple forest, located in the Knobs area of southern Indiana, is considered to be one of the few remaining remnants of the original forests in the region. Although there is no known record of cutting trees in the stand, portions of it were pastured prior to its acquisition by the Forest Service in 1941. Also, a tornado in 1897 blew down most of the larger trees in a strip about 160 m wide through a portion of the stand. Otherwise, the forest appears essentially undisturbed.

Following the 1978 growing season, permanent plots were established in the stand on a 50 m by 50 m grid. All trees 15 cm dbh and larger were measured and mapped on a 0.1 ha circular plot, and trees between 5 cm and 15 cm were measured and mapped on a 0.01 ha circular plot in the center of the main plot. These plots were remeasured following the 1989 growing season. Two of the 153 plots were located in a pine planting, 15 plots were bordered by private lands (open pasture and harvested forest), and 15 plots were in old pasture areas. Thus, the following descriptions are based on the data from the 121 remaining plots, representing 30.25 ha.

The total number of trees has declined from 620 per ha in 1978 to 522 in 1989. The basal area (sq. m per ha) increased slightly from 27.1 to 27.8, while the overall stocking percent went from 95 to 93. Seventy-six trees per ha grew passed the 5 cm minimum dbh threshold, and 175 trees per ha died during the 11 year period between measurements. A total of 32 species were represented by at least one individual in the 1978 sample; in 1989, there were 33 species.

Sugar maple (*Acer saccharum* Marsh.) was by far the most prevalent species in both 1978 (48 percent of the trees) and 1989 (55 percent). Dogwoods (*Cornus florida* L.) were a distant second at 8 percent in 1978. In 1989, the second most numerous species was beech (*Fagus grandifolia* Ehrh.) at 8 percent. In terms of basal area, sugar maple was 25 percent and 27 percent, respectively, in 1978 and 1989, followed by beech at 15 percent in 1978 and yellow poplar (*Liriodendron tulipifera* L.) at 16 percent in 1989.

¹Research Forester, North Central Forest Experiment Station, 1-26 Agri. Bldg., U. of Missouri, Columbia, MO 65211, Research Natural Area Coordinator, Northeastern Forest Experiment Station, For. Sci. Lab., P.O. Box 640, Durham, NH 03824, Professor and Associate Professor, respectively, Southern Illinois University, Department of Forestry, Carbondale, IL 62901.

Fifty-two percent of the ingrowth trees were sugar maples. Of the 12 other species that were represented by ingrowth, dogwood was the next most numerous at 14 percent. However, more stems of these two species died than of any others. Sugar maple was 26 percent of the mortality, while dogwood was 16 percent.

The visually-dominant portion of this old growth stand, those trees at least 51 cm dbh and larger, increased from 31 trees per ha in 1978 to 34 trees in 1989. Basal area per ha increased from 11 sq m to 12 sq m, representing 41 percent of the total basal area in 1978 and 44 percent in 1989. Of the 19 species composing this portion of the stand, beech was most numerous in 1978 (24 percent of the total number), followed by yellow poplar at 13 percent. Sugar maple was the sixth most numerous at eight percent. In terms of basal area, the pattern was similar. Beech was 28 percent of the total, followed by yellow poplar at 13 percent, and sugar maple was seventh at seven percent.

During the 11 year study period, mortality of these large trees amounted to 5.5 trees per ha and 2 sq m of basal area. Fifty-two percent of the trees lost were beeches (60 percent of the basal area). Black walnuts (*Juglans nigra* L.) and sugar maples were 11 percent each.

By 1989, yellow poplars were the most numerous large trees (19 percent of the total number), with beeches now second at 15 percent. The basal area represented by these two species was nearly equal (18 percent and 17.5 percent respectively). Sugar maples were still sixth in number (eight percent) and moved to sixth in basal area (six percent).

The most notable change from 1978 to 1989 is the loss of the large beech trees. Thirty-eight percent of the large beech trees that were present in 1978 died. During the same period, ingrowth into the large tree size class was sufficient to replace only 12 percent of the mortality. The largest of the dying beeches was 104 cm dbh, while several others were over 80 cm. Thus, several large gaps in the canopy were created.

Another important change in the overstory is the increase in number of yellow poplar trees. Overall, eight new trees per ha grew passed the 51 cm threshold. Thirty-two percent of these were yellow poplars. The next most numerous recruits were black oaks (*Quercus velutina* Lam.) at 13 percent, followed by white oaks (*Q. alba* L.) and northern red oaks (*Q. rubra* L.) at 11 and 10 percent, respectively. Sugar maples were the fifth most numerous recruits at eight percent.

During this relatively short study period of 11 years, there have been several significant changes in what was thought to be a relatively stable community. The total number of live trees dropped by 16 percent, while the basal area and stocking percent remained relatively constant. The number of large trees increased by eight percent, while at the same time the most numerous large tree species in 1978, beech, was represented by 34 percent fewer trees. If such stands are to be used as benchmarks representing the original forests, it will be necessary to describe not only the composition and structure at a particular point in time, but also the expected amount and type of variation over time.