

# ACIDIC DEPOSITION AND RED SPRUCE IN THE CENTRAL AND SOUTHERN APPALACHIANS, PAST AND PRESENT

Mary Beth Adams<sup>1</sup>

---

During the 1980s, the Spruce-Fir Research Program, part of the Congressionally mandated National Atmospheric Precipitation Assessment Program (NAPAP), investigated the links between acidic deposition and decline and mortality of red spruce forests in the eastern United States. The Spruce-Fir Research Program was highly successful in advancing the state of knowledge on spruce-fir ecosystems, particularly in the northern and southern Appalachians and was one of the few to convincingly document the effects of acidic deposition on spruce ecosystems. However, relatively little research was conducted in the central Appalachians at that time. We learned that there was significant mortality of red spruce in the Adirondacks and northern Appalachians and some growth declines documented in the southern Appalachians. A plausible mechanism, changes in cold tolerance resulting from changes in soil and tissue chemistry resulting from acidic deposition, was identified for the northern Appalachian and Adirondack mortality, and much excellent research furthered our understanding of these important forest ecosystems. The results of this research were documented in the 1992 book, "Ecology and Decline of Red Spruce in the Eastern United States."

Since publication of the book, research effort has continued, at a significantly lower level of activity, in the northern and southern Appalachians. Trends in air quality in the eastern U.S. have improved significantly since the passage of the Clean Air Act Amendments in 1990, but the central Appalachians still receive some of the most acidic deposition in the United States on a chronic basis. Relatively little effort has focused on the central Appalachians since 1992, although the scarce evaluations of the health of spruce forests in the central Appalachians have revealed few problems. Our understanding of the structure and importance for habitat of spruce forests in the central and southern Appalachians has improved since the NAPAP days, but significant research needs still exist relative to acidic deposition, particularly related to soil calcium levels, and to interactions with climate change.

---

---

<sup>1</sup> Mary Beth Adams, U.S. Forest Service, Timber and Watershed Laboratory, P.O. Box 404, Parsons, WV 26287; 304-478-2000x130; Email: mbadams@fs.fed.us