

SYNTHESIZING CHANGING OAK SPECIES DISTRIBUTIONS, MAST AVAILABILITY, AND EFFECTS ON WILDLIFE SPECIES UNDER FUTURE CLIMATE, SOCIAL, AND LAND-USE CHANGE

**Laura M. Thompson, Joseph D. Clark, Stacy L. Clark, Jane Foster,
and Scott E. Schlarbaum**

The eastern hardwood forests of the United States play a crucial role in supporting wildlife through the production of mast crops, particularly acorns, which serve as vital energy sources for various species during fall and winter. However, mast failures and historical forest disturbances have raised concerns about the future abundance of mast-producing trees, especially oak species. Despite the recovery of forests since the late 19th century, oak regeneration rates have declined. Understory fire suppression has allowed fire-intolerant species to encroach, posing a risk of shifting forest types. Climate change further complicates the picture, with warming temperatures and drought affecting oak regeneration differently. Given that a significant portion of the eastern deciduous forest is privately owned, social challenges arise in decisionmaking by landowners. We address these complexities by leveraging a diverse knowledge base in forest and wildlife ecology. Compiling data on changing oak abundance, masting variability, and impacts to wildlife, we synthesized available science as part of an expert-elicited ecosystem model to depict interactions among hardwoods, masting events, wildlife abundance, and survival under future climate, social, and land-use scenarios. The outcomes can inform decisionmaking processes regarding forested regions and evolving wildlife abundance, providing a comprehensive understanding of the challenges and potential futures for these vital ecosystems.

Laura M. Thompson, U.S. Geological Survey, National Climate Adaptation Science Center, Knoxville, TN 37996, USA

Joseph D. Clark, U.S. Geological Survey, Northern Rocky Mountain Science Center, Knoxville, TN 37996, USA

Stacy L. Clark, U.S. Department of Agriculture, Forest Service, Southern Research Station, Knoxville, TN 37996, USA

Jane Foster, U.S. Department of Agriculture, Forest Service, Southern Research Station, Knoxville, TN 37996, USA

Scott E. Schlarbaum, The University of Tennessee, School of Natural Resources, Knoxville, TN 37996, USA