

AMAZING AMERICAN *QUERCUS* COMMUNITIES UNDER THREAT

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PURPOSE AND SCOPE

Quercus is the most species rich genera in the Northern Hemisphere, and 60 percent of its 435 species occur in the Americas (Canda, United States, Mexico, Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, and Columbia) (fig. 1). This geographic and evolutionary omnipresence is attributed to lineages that allowed advantageous use of site resources and phenological fitness and plasticity, with modern maintenance and spread a result of the role of humans (Cavender-Bares 2019). For example, drought adaptations separate close *Quercus* relatives along an elevation gradient, and tradeoffs between growth rate and reproductive fecundity separate species along fire intensity gradients. White oaks and red oaks often coexist in the same stands, partly because they differ in their susceptibility to disease and tend to not spread the same diseases. Hybridization of *Quercus* also contributes to its adaptation across the Americas. *Quercus*-dominated forests, predicated on high genetic diversity, rapid migration rate, high rates of ecological divergence and physiological flexibility, and hybridization, are nevertheless under local and global threats. Some examples of those threats and conservation practices to increase sustainability will demonstrate our knowledge and determination to maintain this valuable genus throughout the Americas.



Figure 1—(a) *Quercus douglasii* is a California, USA, endemic oak species found on thin, dry sites (USDA Forest Service photo by Erik Knapp); (b) *Q. humboldtii* is found in montane cloud forests of Columbia, South America (USDA Forest Service photo by Dan Dey); and (c) *Quercus* species dominate the canopy of a mature upland hardwood forest in Kentucky, USA (USDA Forest Service photo by Callie Schweitzer)

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APPROACH

Oak wilt is a predominant threat to Canadian oaks, especially in urban areas. In western Canada, *Q. garryana* woodlands are threatened due to changes in Indigenous land management and fire regimes. In the Western United States, *Q. garryana* and *Q. chrysolepis* woodlands are also of high concern, with integrated ranch-woodland management needed for retention. In the Eastern United States, mesophication, the result of disruptions in the disturbance regime (lack of fire, decreases in harvesting, climate change) created conditions in which natural regeneration of all *Quercus* species is concerning, with restoration by using adaptive silviculture ongoing. The golden-cheeked warbler (*Setophaga chrysoparia*), a globally endangered bird, drives collaborative conservation practices in *Quercus* forests in Mesoamerica that include habitat connectivity, oak utilization, and mitigating land-use changes (Perez et al. 2007). In Columbia, treating montane cloud forests containing *Q. humboldtii* is focused on curbing grazing and fuelwood collection, while using silviculture to encourage establishment and growth of natural reproduction (Avella et al. 2016).

FINDINGS AND IMPLICATIONS

Quercus landscapes in the Americas are often mosaics of production systems (i.e., agriculture, livestock). They suffer from overexploitation of original forest cover for forest products and land-use changes, primarily agricultural expansion and urbanization. Restoration strategies focus on integration of maintaining, sustaining, and increasing oak dominance in these forests while meeting the demands of the local communities, including hydrological regulation, soil protection, and sustained sources of timber, fuelwood, and other nontimber forest products. Sustaining *Quercus* in Canada, the Eastern United States, and Columbia is possible through shared silviculture prescriptions that favor the establishment, recruitment, and release of natural regeneration through sequential introduction of disturbances that decrease stand density and increase understory light. Woodland systems integrated with ranching in the Western United States and Mesoamerica are promoting conservation strategies that detail native *Quercus* distributions, existing threats, and natural regeneration status, while supporting farming and ranching operations compatible with oak woodlands. Success of adaptive management for conserving American oaks is predicated on social and economic drivers, and addresses our changing environments, from fire regimes to wood utilization demands.

LITERATURE CITED

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