

Researchers rediscover oak tree thought to be extinct

One Quercus tardifolia found clinging to life in Big Bend National Park

Key Messages:

- **Researchers from a coalition of institutions have identified a living specimen of an oak that was presumed extinct for more than a decade (*Q. tardifolia*). The tree in Big Bend National Park in Texas is in dire condition, facing fungal infection and elevated fire risk due to climate change. The coalition is currently working in collaboration with the National Park Service to reduce immediate threats.**
- *Q. tardifolia* was reported on rare occasions into the 2000s, before the last known tree was believed to have perished in 2011. A coalition of researchers from more than 10 institutions sought to determine whether *Q. tardifolia* may still exist.
- Molecular analysis is underway at The Morton Arboretum to confirm whether the DNA from the discovered tree matches previous *Q. tardifolia* specimens. This research will reveal deeper information about oak species and hybridization. By studying and protecting this exceptionally rare individual, researchers hope to prevent species from going extinct in the future.



Washington (July 7, 2022)--Botanical researchers rep

more than 10 institutions have discovered an oak tree once thought to be extinct, and now in immediate need of conservation within Big Bend National Park.

Researchers led by The Morton Arboretum and United States Botanic Garden (USBG) were thrilled to find a lone *Quercus tardifolia* (*Q. tardifolia*) tree standing in Big Bend National Park, Texas, although it is in poor condition. First described in the 1930s, the last living specimen was believed to have perished in 2011.

"This work is crucial to preserve the biodiversity that Earth is so quickly losing," said Murphy Westwood, Ph.D., vice president of science and conservation at The Morton Arboretum. "If we ignore the decline of *Q. tardifolia* and other rare, endangered trees, we could see countless domino effects with the loss of other living entities in the ecosystem. These are the keystone species of those trees," she said. According to Westwood, *Q. tardifolia* is considered one of, if not the rarest oak in the world.

The team that made the discovery on May 25, 2022, described a dire scene. The trunk is scarred by fire and shows signs of severe fungal infection. A drought potential to end its life, say the scientists who also report that climate change makes this outcome more likely every year. The group is now working with the land manager to reduce the immediate wildfire threat to the tree, and conservationists in this collaborative are moving quickly to return to search for acorns and to attempt the process of breeding specimens from a parent plant.

"This is important, collaborative research that is necessary for the conservation of *Q. tardifolia*," said Carolyn Whiting, a botanist at Big Bend National Park. "We support a high diversity of oak species, partly because of the wide range of habitats available in this 'sky island.' There is still much to learn about the oaks in this area."

"The United States Botanic Garden is thrilled about the success of this partnership and collecting trip that rediscovered such a rare oak," said Susan Pell, director at the United States Botanic Garden, which is funding and collaborating on the project. "This discovery is just the beginning of the conservation work. We have a partnership with The Morton Arboretum to better understand and conserve threatened trees."

Other collaborators were Bartlett Tree Research Laboratories and Arboretum; Lady Bird Johnson Wildflower Center; NatureServe; Polly Hill Arboretum; San Diego State University; University of California, Davis Arboretum and Public Garden; and The Sul Ross State University A. Michael Powell Herbarium.

What might molecular analysis reveal about *Quercus tardifolia*?

Oaks tend to hybridize, or crossbreed, which may allow them to adapt more quickly to changing climate conditions such as extreme heat and new diseases. Hybridization can also blur the genetic lines between oak species in a given ecosystem like Big Bend. Molecular analysis will confirm whether the DNA of the new collection matches that of previous samples of *Q. tardifolia*, but according to the researchers, there is a chance that the analysis will raise more questions than answers.

According to Andrew Hipp, Ph.D., senior scientist in plant systematics and herbarium director at The Morton Arboretum, whose team will be conducting the molecular analysis, it's an interesting problem. "We're looking into whether this tree is genetically similar to other trees that have been previously collected as *Q. tardifolia*. That should tell us if the collection is the same as what Cornelius H. Muller named *Q. tardifolia*. It should also tell us whether this collection of specimens is genetically distinct enough from other related oaks in the area to warrant recognition as a species."

Regardless of classification, Hipp noted that it is important to preserve more than individual species, but rather all the genetic variation in life. "Species are just labels for populations that we can generally recognize in the field," he said. "But they aren't the be-all and end-all of conservation. We also aim to protect the functional traits of species. Leaf forms, physiological responses to drought and fire and even tree longevity are all attributes that can be shared among populations and among species. The functional variation that these new collections represent may be just what is needed to help oaks of the region adapt to environmental changes in the future."



Preserving oaks is critical to ecosystems

Oaks are exceptional among tree species in that their acorns cannot be traditionally seed banked for conservation purposes. According to the researchers, acorns must be stored in the wild or in living collections, which is why the involvement of botanical gardens is critical. The researchers who found the *Q. tardifolia* tree are concerned about the future of acorns. Other methods of propagation, including grafting, are being pursued to preserve the oak's future.

"Across the planet, oaks serve as an ecological anchor cleaning air, filtering water, sequestering carbon dioxide and supporting countless fungi, insects, birds, and mammals," Westwood explained. "When one is lost, we don't know what else we might permanently lose in its wake," she said.

However, Westwood, Pell and others warn that conservation efforts such as this require collaborative initiatives, such as the Global Conservation Consortium, the involvement of botanical gardens and a variety of scientific experts to secure a future for endangered trees.

"In many ways, this tree is an ancient relic. Due to the changing climate, the world is completely different now than when it evolved," said Wesley Knapp, co-leader of the expedition from NatureServe, who participated in the expedition. "It is incumbent upon us to learn from it and protect it while we still can in order to inform future conservation efforts. Nature rarely hands us a second chance, and I doubt we'll get a third. We won't waste it."

Members of the May 2022 expedition that first located the lone *Q. tardifolia* tree included Adam Black of Bartlett Tree Research Laboratories and Arboretum, Antonio Botanical Garden, Emily Griswold of UC Davis Arboretum and Public Garden, Wesley Knapp of NatureServe, John Saltiel of USBG, Phillip Schulz of the Wildflower Center, Elizabeth Thomas of Polly Hill Arboretum, Kelsey Wogan of Sul Ross State University A. Michael Powell Herbarium and Zarah Wyly, an ornamental tree researcher in California.

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Eds: Hi-res photos and b-roll in Dropbox

Media contacts: Tyler Prich, The Morton Arboretum, 937-286-0496 and Devin Dotson, U.S. Botanic Garden, 202-306-6743

About The Morton Arboretum

The Morton Arboretum is a world-renowned leader in tree science and research. Its 1,700 acre site includes 222,000 tree and plant specimens, representing 100 countries. The Arboretum's Center for Tree Science collaborates with researchers around the world, contributing scientific knowledge and technical expertise to the study of trees. The Arboretum's Global Tree Conservation Program leverages the expertise of the botanical garden community to protect and restore vulnerable tree species. Additional information about the Arboretum's scientific work and how it contributes to a greener, healthier world for future generations can be found at [mortonarb.com](https://www.mortonarb.com)

About the United States Botanic Garden

The United States Botanic Garden (USBG) is the oldest continuously operating public garden in the United States, created by Congress in 1820. The USBG is dedicated to the importance and fundamental value and diversity of plants, as well as their aesthetic, cultural, economic, therapeutic, and ecological significance. With over 100 years of experience, annually, the USBG strives to demonstrate and promote sustainable practices. It is a living plant museum accredited by the American Alliance of Museums and the International Conservation International. www.usbg.gov

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