



Forest Fungi: Supporting Forest Resiliency

Wild Places Program

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Working With the Trees, Not Against Them

For over a century the US Forest Service has largely approached Forest management and fire safety through the lens of trees being either timber, or fuel; and as if tree density, and thus competition, is the only variable that impacts both. This approach continues today even in the face of twin biodiversity and climate crises, and in the face of a growing body of evidence that native fungi, including mycorrhizal fungi, play an incredibly important role in forest resiliency, restoration, and productivity. Mycorrhizal fungi (literally “fungus root”), work in cooperation with native trees and plants, providing them with additional access to moisture and nutrients, increasing their health and resilience. In return, the fungi receive sugars and carbohydrates from plants. Mycorrhizae may also enable underground exchanges of nutrients, and water, and create an underground network of chemical communications within the forest. These interactions demonstrate that trees are not just sticks in the ground only in competition for resources, but participate in an interrelated web where there are mutualistic and positive interactions among trees, plants, fungi and wildlife.

Native fungal communities provide a diverse suite of services that help plants, and natural communities, be resilient to drought, wind, erosion, pests, and much more. At least one study has shown that positive interactions between plants likely helped certain plant species survive prior climate shifts. Other evidence shows that synergies develop, such that increased forest structure are intertwined with increased species diversity, increased moisture, moderated temperatures, and carbon storage. In a world faced with increasing temperatures and drying from climate change, protection and restoration of little considered mycorrhizal fungi will be crucial for true forest resiliency. For this reason, Guardians is developing and promoting a holistic view of forests as interdependent, connected ecosystems. A view counter to current federal land management that largely excludes these interconnections, and actually depletes the beneficial aspects forest fungi provide through their soil disturbing activities like those related to forest thinning and logging. Guardians believes that organisms of all kinds interact in positive ways and we must work with the trees, not against them.

Mycorrhizae serve as natural climate solutions by sequestering carbon underground and improving aboveground carbon storage via increased plant growth. However, many studies report declines in mycorrhizal fungi around the globe. Recognizing the importance of these important, underground plant helpers, WildEarth Guardians will be leading a Forest Fungi campaign that will bring forward the importance of mycorrhizae in forest resiliency, and ensure the US Forest Service adopts policies and practices that restore and protect the mutualistic associations of fungal species in forest ecosystems, particularly mycorrhizae. No other organization in the US, or possibly the world, has a team that brings together scientific expertise, advocacy skills, and legal acumen needed to do this work as WildEarth Guardians.

Guardians will be taking a multifaceted approach to advance our campaign toward our broad goal in 2023. This includes:

- Deepening the science of mycological interactions to fill knowledge gaps, by contributing to scientific papers, articles and databases of information.
- Reducing the gap between science and management by providing best management practices and developing trainings for public lands managers and restoration practitioners that address the protection and restoration of mycorrhizal fungi.
- Identifying Forest Service policies and advocating for changes that will move the agency to restore or preserve the mutualistic associations of fungal species in forest ecosystems by reviewing agency monitoring protocols, management practices and policies directing their use, and the best available science, to identify and craft suggested changes.
- Building a broad constituency that creates sufficient power to move the Forest Service toward protecting and restoring forest fungal interactions, particularly mycorrhizae and mycorrhizal networks.
 - This includes identifying and conducting presentations and outreach to a variety of groups, including groups traditionally overlooked by the conservation community such as mushroom societies, spiritual groups, ecotherapy communities, Tribes/Tribal groups, Land Grant communities, and traditional acequia communities.
 - Develop an overarching story of how FS vegetation management affects temperatures, solarization, moisture levels, wind speeds, mycorrhizae, other fungi, etc. and use this to challenge the USFS fire arguments.

- Working with our Wildlife Team to determine how Endangered Species Act protections apply to fungal species, identify relevant species that could qualify for listing under the ESA; support listing petition activities through publishing of a legal law review article.
- Developing template NEPA or other comments to use in Forest Watch related actions as applicable to challenge projects and their failure to consider the importance of, and impacts to mycorrhizal fungus; and begin to develop a record and process for future legal challenges.
- Beginning to develop a community science monitoring program that would help identify specific areas with important existing fungal interactions, particularly mycorrhizae, and gather data on mycorrhizae and other metrics linking ecosystem integrity and habitat protection. Potential locations for monitoring include the North Kaibab, Santa Fe, and Gila forests.

Taking on these actions in 2023, Guardians will be working toward Holding the Forest Service accountable to protect and restore forest fungi utilizing more nuanced, responsive management techniques that work with forest interactions to support increased moisture, carbon sequestration, biomass and biodiversity and reduced temperatures, reduced wind speeds, and impacts of climate change.