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First name: Clifford

Last name: Bradley

Organization:

Title:

Comments: I want to address what I see as important deficiency in the Lolo Forest Plan; the absence of any discussion of mycology or of fungi as an integral component of forest ecosystems. Fungi need to be integral to decisions regarding forest management.

The plan quotes the mission of the Forest Service, which is "to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations."

Page 9 of the plan lists an overview of life in the Lolo National Forest: 17 conifer and 5 hardwood tree species, over 200 bird species, at least 20 species of fish, over 60 mammal species and an estimated 1,500 plant species including 250 non-native plant species. I personally know of a couple hundred fungal species present in the Lolo National Forest. There is no mention of the hundreds or even thousands of fungal species; the plan omits any discussion of an entire kingdom of life.

Fungi are essential to the mission of the Forest Service, to forest health; trees would not exist without mycorrhizal fungi. Fungal decomposers are essential to carbon cycling, carbon sequestration, and soil structure. Fungi are essential for restoration of disturbed habitats, decommissioning roads, and recovery from wildfires. Effects of decisions for logging, thinning projects, slash burning, road construction, recreation, need to account for impacts on fungal populations. If fungal populations are unknown, then fungal populations need to be studied and inventoried.

Fungi are also important to forests in ways science is just beginning to understand. For example, fungal insect pathogens are important in regulating insect populations. In a project several years ago, my company isolated some 30 strains in three species of fungal insect pathogens from infected bark beetles in three different species. In some cases, we found fungal bark beetle pathogens living in beetle galleries as endophytes in spruce trees. Naturally occurring fungi could be used to manage damaging and invasive insects without the use of chemical insecticides.

Chapter 2 addresses ecological sustainability ecosystem integrity and species diversity without once mentioning fungi. For example, mushrooms are an important in species diversity as a key food source for a mammals, squirrels, deer etc. The plan also does not discuss the importance of fungi in forest ecology as disease organisms in plants, nor the effects of disturbances in spread of plant diseases.

Ecosystem services are discussed on page 59 including soil health, medicine, climate mitigation and forest products all of which depend on healthy and diverse fungal populations.

The plan states that "carbon storage and sequestration potential is sustained by biologically diverse and resilient ecosystems that are adapted to natural disturbance processes and changing climates." The plan notes the importance of organic substrates (vegetative litter, coarse woody debris, and soil organic matter) present in sufficient amounts to support soil fertility and ecological functions. The ecology of carbon cycling by wood decaying fungi is fundamental to any discussion of carbon sequestration, soil organic matter and degradation of coarse woody debris.

Fungi could be used to decompose logging slash, keeping carbon in the soil rather than burning and releasing CO<sub>2</sub>.

The plan states that "Ecosystem desired conditions are designed to maintain and enhance ecological integrity, diversity, function, and resiliency while contributing to social and economic sustainability as required by the 2012 Planning Rule. Desired conditions are based on an analysis of the natural range of variation which provides an understanding of how ecosystems are dynamic and change over time in a manner that is resilient to perturbations and disturbance. As such, the natural range of variation is a guide to understanding how to maintain or restore a resilient ecosystem with structural and functional properties that will enable it to persist into the future."

Without including fungi in the analysis, there is no way to analyze the range of natural variations or understand how forest ecosystems are dynamic and change over time and resilient to perturbations and disturbances. The sections on monitoring do not include any monitoring of fungal populations or species diversity in forest

ecology.

I could discuss many other examples of the importance of fungi in forest ecology and the need to include fungi in the Forest Plan. The Forest Service needs to hire mycologists and the Forest Plan needs to be substantially modified to include the Kingdom Fungi in the analysis.