Jens T. Stevens

New Mexico Landscapes Field Station

U.S. Geological Survey

Santa Fe, NM, 87508

Matthew M. Kling

Department of Integrative Biology

University of California

Berkeley, CA, 94703

Editors-in-Chief, Frontiers in Ecology and the Environment

23 January 2019

To Whom It May Concern:

We are submitting the manuscript “Biogeography of fire regimes in western US conifer forests: a trait-based approach”, coauthored with Dylan Schwilk, Morgan Varner, and Jeffrey Kane, to be considered for publication as a research paper in *Frontiers in Ecology and the Environment*. This is an initial submission.

There has been a recent proliferation in the use of functional traits in ecology to describe variation in adaptive niche environments. However, the application of functional traits to vegetative communities has primarily occurred at small spatial scales and in manipulative experiments. In this paper we present a novel application of functional traits to understand biogeographic variation in conifer forest niches at a continental scale. Specifically, we focus on traits related to mature tree survival of forest fire. This is an issue of increasing importance as climate change drives increasing fire frequency, and the past century of forest management has created forests with increasing fuel loads and susceptibility to stand-replacing fire and potential forest type conversion.

We present the first synthesis of multiple functional traits related to conifer tree fire resistance, and develop an index of community fire resistance that can be applied to conifer stands across the western United States. The biogeographic representation of this community fire resistance, developed using species distribution models of 29 common western conifer species, provides insight into adaptive fire regimes in different regions, and how forest management to improve fire resilience may be targeted to those regions with the most fire-resistant species. In particular, we demonstrate general agreement with our index of fire resistance and independent assessments of fire frequency and fire regimes, while also identifying areas that may be more fire-sensitive than their historical fire regime would indicate, due in part to encroachment of fire-sensitive species in the absence of a century or more of fire. This fire resistance index has numerous potential applications in forest planning and will provide scientists and researchers with a quantitative way to compare resilience of different species mixtures to increasing fire frequency, an approach that may be extended to other ecosystems globally in the future.

We certify that the accompanying manuscript, and the data contained therein, has not been published and is not under consideration for publication with another journal. We have no conflicts of interest to declare. We have approved the current version this manuscript for publication with *Frontiers in Ecology and the Environment*.

Sincerely,

Matthew M. Kling

University of California Berkeley

Dr. Jens T. Stevens

Sig1

US Geological Survey