

Publication Brief for Resource Managers

Release:
May 2011

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Evolutionary Origins of Plant Adaptations Should Not Influence Fire Management Decisions

In response to a recent criticism of the practice of prescription burning published in *Trends in Plant Science*, USGS scientist Jon Keeley and colleagues from Spain, South Africa and Australia contend that when applied within the context of a landscape's natural fire regime, prescribed burning remains a viable treatment to manage native plant ecosystems.

Critics use plant trait origins as arguments against fire management practices. But as Keeley and colleagues point out, this argument offers flawed logic about adaptive traits and fails to provide the necessary information required to maintain biodiversity in fire-prone ecosystems.

First, no plant species is “fire-adapted” but rather, a species can bear adaptive traits that help it survive a particular fire-regime — some plants may be adapted to frequent fires, others may be adapted to infrequent fires. It is a plant's functional response to the particular fire regime of its landscape that dictates how a species will respond to fire management practices.

Second, natural selection processes that resulted in these functional traits may have taken place over hundreds of millions of years. Although it is possible that a fire-adaptive trait originally functioned as a response to some other selective pressures, this cannot be used as an argument against contemporary fire management practices.

Natural selection theory suggests that a trait will be retained if it benefits the species under new pressures. Regardless, there is good fossil evidence showing that contemporary fire regimes — including both surface fire and crown fire regimes — have been part of the adaptive landscape since the Paleozoic Era. Thus, fire has been a potential selective force long before even the time of the dinosaurs.

Management Implications

- In recent decades, extraordinary fossil flora have accumulated. This record lays the framework for fire as a potential ecosystem process since the evolution of the earliest land plants. This record is remarkable in showing that contemporary fire regimes including surface fire and crown fire regimes have been present since before the time of the dinosaurs.
- Plant traits adapted to fire-prone landscapes are finely evolved to enhance survival and fitness under specific fire regimes. So-called ‘fire-adapted’ species can be threatened when humans alter the fire regime, either by increasing or decreasing fire frequency.
- Useful predictions about fire effects on native ecosystems are made on the basis of contemporary function and without regard to plant trait origins.

THIS BRIEF REFERS TO:

Keeley, J.E., J.G. Pausas, P.W. Rundel, W.J. Bond, R.A. Bradstock. 2011. Fire as an Evolutionary Pressure Shaping Plant Traits. *Trends in Plant Science*. doi: 10.1016/j.tplants.2011.04.002

THIS BRIEF AND PUBLICATION IS IN RESPONSE TO:

Bradshaw, S.D., K.W. Dixon, S.D. Hopper, H. Lambers, S.R. Turner. 2011. Little Evidence for Fire-Adapted Plant Traits in Mediterranean Climate Regions. *Trends in Plant Science*. doi: 10.1016/j.tplants.2010.10.007

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