



PHOTO GALLERY

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LESSONS FROM FOUR DECADES OF MONITORING VEGETATION AND FIRE: MAINTAINING DIVERSITY AND RESILIENCE IN FLORIDA'S UPLANDS

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Study Description

Worldwide, humans are altering the fire regimes of fire-prone ecosystems. Efforts to restore fire regimes in natural areas are usually guided by fire-management plans (FMP) using prescribed burning. We assessed an FMP by repeatedly sampling 11 Florida uplands impacted by 2 to 11 fires each during a 38-year period. Stands exhibited ecological resilience with little plant composition change and modest abundance shifts. Resilience was not eroded by repeated FMP-prescribed fires. Species richness and diversity were significantly higher at the end vs. beginning of our study, suggesting that FMP-applied fire regimes are within the range of those with which species evolved.

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Photo 1. Smoke from a head fire (one moving with the wind) blots out the sun as fire rapidly consumes flatwoods and oak scrub vegetation during a prescribed burn at Archbold Biological Station, Venus, Florida, USA. Photo credit: Warren Abrahamson.



Photo 2. Fires can create burn-severity mosaics in Florida uplands ranging from intensely burned wet prairie and flatwoods (foreground) to unburned bayhead vegetation (background). Such pyrodiversity promotes habitat diversity that is crucial for many plant and animal species that inhabit fire-prone landscapes. As natural areas fragment into “islands,” tolerance of burn heterogeneity is crucial to the long-term success of at-risk animals and plants. The aluminum pins seen in the photograph’s center mark a portion of one of our vegetation transects. Photo credit: Warren Abrahamson.



Photo 3. This image, taken 11 days after fire, shows a wider view of the same area shown in Photo 2 and illustrates the rapid regrowth of Florida-endangered cutthroat grass (*Coleataenia abscissa*). For simplicity, FMPs usually assign fire-return intervals to burn units based on principal vegetation despite many units containing multiple vegetation associations such as this one that contains wet prairie, flatwoods, and bayhead. With care, land managers can enhance or diminish the likelihood of burning minor associations embedded within the matrix of a principal association. Maintaining embedded associations enhances spatial heterogeneity and promotes diversity. Photo credit: Warren Abrahamson.



Photo 4. Seedlings of obligate-seeding Florida rosemary (*Ceratiola ericoides*) emerge among the skeletons of fire-killed adults. Our results identified negative consequences for Florida rosemary when fire-return times were too frequent since the plant requires ≈ 10 years. to produce seed to replenish its seed bank. Yet, gap-specialist forbs declined when fires were too infrequent. Managing the persistence of seed banks and the maintenance of gaps is crucial. Photo credit: Warren Abrahamson.



Photo 5. Rosemary scrub contains gaps that host numerous forbs, many of special concern, as well as obligate-seeding woody species like Florida rosemary and sand pine (*Pinus clausa*, the nearest pine), and resprouting species such as scrub oak (*Quercus inopina*), saw palmetto (*Serenoa repens*), and scrub palmetto (*Sabal etonia*). Fire-resisting slash pines (*P. elliotii*) are silhouetted on the horizon. Photo credit: Warren Abrahamson.

These photographs illustrate the article “Lessons from four decades of monitoring vegetation and fire: Maintaining diversity and resilience in Florida’s uplands” by Warren G. Abrahamson, Christy R. Abrahamson, and Matthew A. Keller published in *Ecological Monographs*. <https://doi.org/10.1002/ecm.1444>.