Appendix A

Woody biomass allometry

We calculated aboveground dry-weight woody and foliar biomass using species-specific allometry (Nickless et al. 2011) for 5 dominant species in each plot and using functional type characteristics (fine vs. broad leaf) for less common species. When species-specific allometry was not available, we applied either a general fine-leafed or broad-leafed equation to the unknown species (Nickless et al. 2011). We also used this general equation approach when an individual tree was larger than the tree-size class range used in the published species-specific allometric equation (Nickless et al. 2011).

Carbon isotopes

Average grass and tree $\delta^{13}C$ were -12.66‰ and -26.4‰, respectively. The mixing model was structured as follows:

$$x\,(-26.4)+(1-x)(-12.66)=\delta^{13}C_{soil}$$

Where x represents the amount of C in the soil derived from C_3 tissue and 1-x is C_4 tissue.

Expected changes in $\delta^{13}C$ between annual and unburned fire treatments if all inputs of C (+24% total pool size) were due to C_3 tissue were calculated as follows:

$$0.76(\delta^{13}C_{soil})+0.24(-26.4)=\text{expected}$$

This model weights the $\delta^{13}C$ in C_3 tissue (-26.4 ‰) by the percent increase in C (24%) relative to the amount of C in the residual pool. This calculation yielded a value of ~3‰ decrease.

Local canopy enrichment

We calculated the local enrichment of C, N, and P underneath trees as follows:

$$\% \text{ enrichment}_{C,N,P} = (IFT_{C,N,P}-IFO_{C,N,P})/(IFO_{C,N,P})$$

Where IFT is the concentration of C,N and P in soils beneath trees and IFO is the concentration in soils adjacent, but outside, of the tree crown (subscripts indicate the element that % enrichment is being calculated for).

Local soil samples were scaled up to the landscape using spatially-weighted averages determined by total crown area. We calculated crown area using equations developed within the experimental region of Satara in KNP using data from 0.5-ha censuses in the 1970s and 2000s, in which both height and maximum crown diameter were recorded. We developed a relationship between tree height (*h*, in meters) and crown diameter (*c*, in square meters) of individual woody plants across all woody species measured ($r^2 = 0.63$):

$$c=0.862h^{1.48}$$

This equation was applied to the 2012 data to calculate canopy area of woody plants in each plot. While this analysis does not account for either potential fire/herbivory effects on tree allometry (Archibald and Bond 2003, Moncrieff et al. 2011) or crown overlap, it allows comparison of relative differences in crown area across plots and treatments. Moreover, crown overlap is not likely a major confounding effect due to the low amounts of tree cover in this landscape.

Enriched soil values were calculated as:

$$\text{Enriched soil}=CA*IFT_{C,N,P}+(1-CA)*\text{matrix}_{C,N,P}$$

LITERATURE CITED

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