Threats to biodiversity from changing fire regimes and management solutions

The impact of changing fire regimes on biodiversity is driven by contrasting concerns: on the one hand, the increase of high severity fire; on the other, the lack of fire in fire-dependent ecosystems. High severity fire is increasing in proportion across the Klamath region, as is the size of high severity patches, particularly when fires occur during extreme weather conditions. The recovery of fire intolerant species such as lichens is slow and shifts in understory vegetation favor species that can tolerate exposed conditions. Nevertheless, some species favor these early seral habitats. Meanwhile, areas that miss several fire return intervals go through changes such as increased tree density, canopy cover, and duff and litter depth. These conditions are unfavorable to plant species with high light requirement, and birds and insects that require shrubs and floral resources respectively. Yet such habitats are important for fire intolerant species. My first question therefore was to characterize the relative impact of these two trends in fire regimes. (lack of difference between LS and UN; proportion of rarely detected plant species in HS vs LS/UN; proportion of species preferring one over the other.)

1st part:

[need to give proportions of LS/medium/HS from 1984-2017, plus area unburnt.]

[Compare species that show up in indic species analysis to table showing those that are detected at least 2x more in one habitat than the other]

[Talk about change over time in this section]

My second question was to evaluate management options for fostering biodiverse, fire-resilient landscapes. Management that reduces canopy cover has been shown to reduce the risk of high severity fires, which protects communities and reduces risk to ecosystem services such as erosion control, headwater protection, and carbon storage. Yet how biodiversity responds to such management is unclear. I focused on stand that had been managed actively (prescribed burnt) or passively (overlapping wildfires). While low severity and unburnt stands had higher canopy cover (75% and 86% on average, respectively) and high severity burns had lower canopy cover (26% on average), canopy cover in actively and passively managed areas was intermediate (53% and 42% on average, respectively). Some researchers have raised concerns that because some species depend on early-seral habitat, reducing the extent of high severity burns through management could reduce biodiversity. On the other hand, species that require more mesic, shady conditions may also respond negatively to such treatments.

2nd part:

[need to use PERMANOVA or similar to test whether mult = Rx] -> actually Mult = HS!

[Then: proportion of rarely detected species in mult/Rx; proportion of species preferring either HS or LS and whether they are also found in mult/RX]

[Also, species richness, gamma diversity and beta diversity for each?]

[filter to exclude 1987 fires, and also most recent ones perhaps – 2-4 yrs; I can’t do a change over time thing here because of the narrow range of ages of the multiple and Rx burns]