ABSTRACT: With increasing population densities in rural, forested areas, prescribed fire has become a vital tool in limiting wild-fire destruction. While this technique offers much in means of fire prevention, it also has subsequent ecological effects. Previous studies have looked at the effects of these fires as a disturbance regime, however, none have had the data to conduct a comparative analysis of these fires based on intensity. Therefore, a comparative analysis of the affects of fire of varying intensities on physiological differences of over-story trees in a Northeastern oak/pine and pine forest was conducted. To achieve this, sap-flow rates where monitored in conjunction with photosynthetic measurements of Pinus rigida on three sites, Brendan T. Byrne (BTB), Cedar Bridge (CB), and Silas Little (SL), whereby CB and SL are Ameriflux sites. Each study site had two sap-flow monitoring stations, one within the disturbed site of a prescribed burn (FS), and one within a control site (CS) that was not burned. The data was collected between 2011-2013, where each site was burned once, on different years. The most intense fire, BTB, was conducted in March 2011, while SL, the least intense fire was conducted in February 2012. The most recent fire, with an intermediate intensity, was conducted in March 2013 at CB. Immediately following the most intense fire, photosynthetic rates increased in the FS. However, by the following summer of 2012, any effects of the fire had diminished, and the photosynthetic rates of both the CS and FS were not significantly different. The sap-flow rates in the FS of BTB were also subsequently higher than the CS after the occurrence of the fire, and remained so until April 2012. Furthermore, at SL, the photosynthesis parameters were increased in the FS directly following the fire. The effects of the fire were prevalent throughout the first summer following the fire, where the FS had higher photosynthetic rates than the CS. While the photosynthetic rates where effected by the fire, no increase in sap flux was measured at SL FS.