

Title: The Effects of Disturbance and Catastrophic Forest Fire on Submerged Aquatic Macrophytes in a Low Gradient, Open Canopy, Headwater Stream

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Submerged aquatic macrophytes (SAMs) can significantly modify conditions in their environment and can, like other inhabitants of stream ecosystems in the watershed, suffer major impacts from forest fires. Our study aimed to quantify and describe the effects that a catastrophic forest fire can have on four species of SAMs we identified in the East Fork Jemez River, a system highly impacted by the Las Conchas Fire in 2011. For these four species, life history observations were taken, instream biomass was quantified, and macrophyte effects on water quality and response to disturbances were measured. Total mean biomass from 2011-2013 peaked at over 1000 g DW/m². Disturbance events with associated high turbidity (>1000 NTU) and increased stream flow (0.8 m/s) in July/August 2011 caused a notable reduction in biomass, while a flood event in 2013 with lower turbidity (~150-400 NTU) but 4.5x higher flow (~3.6 m/s) caused a lesser drop in standing biomass. SAM biomass recovered and peaked in October 2011. Biomass measures were sensitive to disturbance events during the study period, and continuous measurements of dissolved oxygen (DO) at the site showed that instream DO levels were driven by SAMs. We illustrate the effects on the stream ecosystem by SAMs in a high elevation, low gradient headwater system as well as the delayed but sizable impacts that forest fires can have on SAM communities within affected catchments.

KEYWORDS: SUBMERGED AQUATIC MACROPHYTES; DISTURBANCE; DISSOLVED OXYGEN; HIGH ELEVATION