ECOLOGY – POSTER #34

Effects of Forest Fire on Submerged Aquatic Macrophyte Biomass and Production in a Mountain Stream

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Surface water systems are becoming increasingly critical for human water supply sources as decades of groundwater aquifer depletions limit the amount of available subsurface resources. Possible climate change effects on these water supplies could also create significant economic, ecological and cultural costs. High elevation, 'critical zone' headwater areas, such as the East Fork Jemez River (EFJR) in northern New Mexico, are a key component of these surface water systems and are likely to face multiple negative effects via climate change that could completely change the way these important systems function. Submerged aquatic macrophytes (SAMs) play a key role when present in aquatic ecosystems by providing ecosystem services such as water quality mediation, habitat structure, and primary production. The EFJR in the Valles Caldera National Preserve, NM is a low gradient grassland stream with high primary productivity driven throughout the growing season by three main macrophyte species: *Elodea canadensis*, *Ranunculus aquatilis*, and *Potamogeton richardsonii*. The Las Conchas fire (Jemez Mountains, NM) burned over 157,000 acres of forest and grassland in June and July of 2011, with 60% burned moderately or severely. Post-fire precipitation events caused significant flooding and other fire-associated water quality changes such as increased sediment loads and nutrient concentrations in the EFJR. SAM biomass peaked at 12,235 g/m2 and primary production rates peaked at 15.2 g O2/m2/day just before these precipitation events. Pre- and post-fire assessment and monitoring of the onsite SAM species showed a significant ($p < 0.01$) decline in the SAM biomass present the fall after the fire. Fire-related impacts have negatively impacted SAM biomass and productivity.