"Effects of fire severity and pre-fire stand treatment on plant community recovery after a large wildfire." By Carolyn Hull Sieg, Research Plant Ecologist, Southwest Forest Science Complex, Flagstaff, AZ; (928) 556-2151, csieg@fs.fed.us.

Increasing numbers of large wildfires in western U.S. forests in recent decades have raised concerns about long-term ecological consequences. In addition to the loss of timber and increased soil erosion, large wildfires may greatly alter post-fire plant communities. Especially severely burned areas can provide habitat conditions for a number of colonizing species, including some highly invasive non-native species. However, post-fire seeding intended to reduce soil erosion in severely burned areas may also introduce non-native species either intentionally or unintentionally as seed contaminants. Even some annual species, such as wheat, seeded to provide quick but non-lasting cover, may persist for many years. The Rodeo-Chediski Fire is the largest and most severe wildfire on record in the Southwest. It burned approximately 469,000 acres in 2002, leaving a mosaic pattern of burn severity on approximately 281,000 acres of White Mountain Apache tribal land. We investigated the effect of the pre-fire forest management and fire severity on plant community recovery after the Rodeo-Chediski Fire (Kuenzi and others 2008). We randomly selected 24 study sites within combinations of two levels of fire severity (low and high) and two types of pre-fire forest management practices (treated [cut and burned within 11 years before the fire] and untreated). High severity areas of the fire were seeded with a mixture of mostly native grasses plus wheat. We sampled plant canopy cover and species richness on the four fire severity/treatment combinations two and three years after the fire. We found that severely burned areas, regardless of previous forest treatments, were characterized by high plant canopy cover of mostly colonizing species compared to low severity burn areas. However, cover of non-native plant species was not higher on severely burned areas compared to low severity areas, and wheat seeded after the fire had mostly disappeared two years later. Non-native species present three years post-burn included a number of grasses seeded both before and after the fire. The remaining non-native species were mostly colonizing species common after disturbances in our region. Some highly invasive non-native species, such as cheatgrass, were present but in low abundance. Whether population levels of particularly invasive species remain at the low levels we observed can only be addressed by continuing to monitor these sites. Land managers are using these results in assessing fire-related impacts, designing post-fire rehabilitation practices, and better understanding how past management practices such as cutting, burning, and seeding, influenced both fire severity and post-fire plant community recovery. For more information, see Kuenzi and others 2008 listed in "Publication News" at the end of this newsletter.

Biological Control of Invasive Plants

"Understanding the side effects of classical biological control." By Dean Pearson, Research Ecologist, Forestry Sciences Laboratory, Missoula, MT; (406) 542-4159, dpearson@fs.fed.us.

Classical biological control involves the use of imported natural enemies to suppress or control populations of the target pest species below an economically or ecologically relevant threshold. Biological control is a useful tool for mitigating the impacts of exotic invasive plants; however, its application is not without risk (see Carruthers and D'Antonio 2005, and articles contained in this special issue). Research by me and my colleagues has demonstrated that gallfly biological control agents introduced for spotted knapweed control have several unintended impacts on nontarget species. Our early work found that native deer mice readily consumed gallfly larvae that overwinter in spotted knapweed seedheads and that the superabundance and timing of this exotic food resource can double or triple deer mouse populations (Pearson and others 2000, Ortega and others 2004). Gallfly subsidies to deer mice have since been correlated with a three-fold increase in Sin Nombre hantavirus in deer mouse populations (Pearson and Callaway 2006), a virus that can cause the deadly hantavirus pulmonary syndrome in humans. Most recently, gallfly subsidies to deer mice have been linked to reductions in recruitment of important native forbs through increased predation on seeds (Pearson and Callaway 2008). In this context, biocontrol agents are negatively impacting the very plants they were intended to help (to hear an ESA science podcast of this work, go to http://www.esa.org/podcast/). In an effort to mitigate these negative side effects, we show that herbicide treatment of spotted knapweed can return mouse populations to normal levels by removing the biocontrol food resource (Pearson and Fletcher 2008). However, the real solution to avoiding negative side effects lies in preventing them in the first place. Our research shows that even when biocontrol agents are host-specific (i.e., they do not directly attack unintended species), they can still have substantial nontarget effects through food web interactions (Pearson and Callaway 2003). The solution to this problem is more effective biocontrol agents. Nontarget effects of biological control agents due to food web interactions will likely be biologically unimportant if the agent is not abundant. Successful agents that control the target species will reduce their own populations by eating themselves out of house and home, thus minimizing the potential for nontarget effects (Pearson and Callaway 2005). Consequently, selecting more effective agents both improves weed control and increases safety. For more information, the articles cited above can be found at http://www.fs.fed.us/rm/wildlife/invasives/ and at Carruthers, R. I.; D'Antonio, C.M. 2005. Special issue introduction—Science and decision making in biological control of weeds: Benefits and risks of biological control. Biological Control 35:181-182.