A compilation of scientific information related to fire management policy direction, April 2013

Prepared by Carol Miller, Aldo Leopold Wilderness Research Institute
406-542-4198
cmiller04@fs.fed.us

- Wildfires treat more area on our public lands (3.6 million acres of wildfire/year avg.) (NIFC 2010) than traditional mechanical and prescribed fire treatment strategies combined (2.1 million acres/year avg.) (USDA Forest Service 2003). **The land area treated by wildfire is expected to increase** along with increases in wildfire frequency associated with climate warming (Krawchuk et al. 2009) and flexibility in federal fire policy that allows the management of fire for multiple objectives.

- **Wildfire may limit the occurrence of subsequent fires;** that is, the consumption of flammable fuels by the wildfire may leave the resulting burned area with insufficient fuels to support an ignition. In a simulation analysis of suppressed ignitions during 1994-2006 in two case study landscapes in the Sierra Nevada, we found 39 such ignitions. Reduced wildfire occurrence lessens the need for initial attack resources and continued suppression operations, leading to cost savings and lower exposure to risk in subsequent years. In the two case studies examined, we estimate that this equated to at least 300 firefighters and 74 flights (Miller et al. 2008).

- The burned area created by a **wildfire may act as a fuel break** that limits the progression, and therefore the extent, of subsequent fires. The fuel break effect can help to limit the extent of subsequent fires, and fire managers can opportunistically use these previously burned areas (aka "fire scars") as fuel breaks in the safe and effective management of subsequent fires. One study of the effectiveness of existing fuel treatments on subsequent wildfires found that previous wildfires could be viewed as unplanned fuel treatments and were effective at limiting size and probability of fire spread (Cochrane et al. 2012).

- The burned area created by a **wildfire treatment may temper the burn severity** of a subsequent fire. Areas that reburn with reduced severity may require less post-fire rehabilitation and in some cases may even serve to restore landscapes that are resilient to frequent, low-severity wildfires. Holden et al. (2010) studied burn severity across a range of vegetation types on the **Gila National Forest in New Mexico** and found that, in areas burned twice by wildfire, the second fire tended to burn at lower severity than the initial fire. A study of an **upper mixed-conifer forest in the Sierra Nevada, California** found that wildfire affected the size and severity of subsequent fires (Collins et al. 2009). This treatment effect was evident when the time between the fires was short (<9 years). The treatment effect was diminished, however, when fire weather conditions for the second fire were extreme. Parks et al. (in prep) studied burn severity for the Gila-Aldo Leopold Wilderness and the **Frank Church Wilderness** and found substantially lower dNBR (an index of burn severity) for areas that had previously burned within the past 22 years compared to those that had not. This same study also shows that **the moderating effect can last more than 20 years**.

- Decisions informed by **risk analysis** can greatly reduce wildfire threat to the WUI. Analyses by Scott et al. (2012) demonstrated that the likelihood of a wildfire reaching the WUI defense zone was largely predictable from the month and location of its ignition.

- Methods are available to identify locations on the landscape **where fire can have beneficial effects** and locations where it can be detrimental (Black and Opperman 2005).

- When an ignition is aggressively suppressed, potential ecological benefits from fire are foregone and the **deferred fire risk** is likely to increase over time. For example, an analysis shows that 18 fires that were suppressed in 2007 in and adjacent to the Bob Marshall Wilderness Complex would have burned more than 200,000 acres if they'd been allowed to, with several "escaping" the wilderness boundary (unpublished data). However, the analysis also shows that if those fires had been allowed to burn and treat the fuels, they would have reduced fire risk in the future compared to current estimates of fire risk. The decrease in fire risk that would have resulted extends beyond the treatment itself. Further analysis showed this treatment by these 18 wildfires would have reduced the average future fire size (by 11.36%), the average area burned in a typical year (by 17.44%), and the average area burned outside wilderness (by 13.31%).

- **Internal agency perceptions** about the use of fire are important. For example, line officers who perceive there is value in the benefits of fire are more likely to authorize its use in Wilderness (Williamson 2005; Black et al. 2008).

- Trends in **attitudes of Wilderness visitors** indicate increasing support for the use of fire in Wilderness (Knotek 2006).

- Despite running counter to policy and law, fire suppression has been, and continues to be, the dominant fire management strategy in Wilderness. **Fire suppression activities substantially trammel wilderness**, counter to wilderness management goals. This is true even for the largest Wilderness, though it's difficult to track with current record keeping.

Literature cited

Black A, Opperman T (2005) *Fire effects planning framework: a user's guide*. USDA Forest Service, Rocky Mountain Research Station Gen. Tech. Rep.GTR-RMRS-163WWW (Fort Collins, CO)

Black A, Williamson M, Doane D (2008) Wildland Fire Use Barriers and Facilitators. *Fire Management Today*. 68(1):10-14.

Cochrane, M. A., C. J. Moran, et al. (2012). "Estimation of wildfire size and risk changes due to fuels treatments." International Journal of Wildland Fire **21**: 357-367.

Collins BM, Miller JD, Thode AE, Kelly M, van Wagtendonk JW, Stephens SL (2009) Interactions among wildland fires in a long-established Sierra Nevada natural fire area. *Ecosystems* **12:** 114-128.

Davis BH, Miller C (2010) What if we didn't suppress fire?. *In*: Weber, Samantha, ed. Rethinking Protected Areas in a Changing World: Proceedings of the 2009 GWS Biennial Conference on Parks, Protected Areas, and Cultural Sites; 2009 March 1-6; Portland, OR. Proc. Hancock, Michigan: The George Wright Society: 131-134.

Holden ZA, Morgan P, Hudak AT (2010) Burn severity of areas reburned by wildfires in the Gila National Forest, New Mexico, USA. *Fire Ecology* **6**(3)**:** 77-85.

Keane RE, Karau E (2010) Evaluating the ecological benefits of wildfire by integrating fire and ecosystem simulation models. *Ecological Modelling* **221:** 1162-1172.

Knotek K (2006) DVD. Trends in public attitudes towards the use of wildland fire. Third International Fire Ecology & Management Congress proceedings. 2006.

Krawchuk MA, Moritz MA, Parisien M-A, Van Dorn J, Hayhoe K (2009) Global pyrogeography: the current and future distribution of wildfire. *PLoS ONE* **4**(4)**:** e5102.

Miller C (2007) Simulation of the consequences of different fire regimes to support wildland fire use decisions. *Fire Ecology* **3**(2)**:** 83-102.

Miller C., Black, A., Beasley, M., Caprio, A.C. (2008). Final Report Joint Fire Science Program Project Number 04-2-1-110. Available at: http://www.firescience.gov/projects/04-2-1-110/project/04-2-1-110_final_report.pdf

Miller C (2012) The hidden consequences of fire suppression. *Park Science* **28**(3): 75-80.

NIFC (2010) National Interagency Fire Center Statistics. Available at: http://www.nifc.gov/fireInfo/fireInfo_statistics.html

USDA Forest Service (2003) Healthy Forest Initiative: Fuels accomplishments. Available at: http://www.fs.fed.us/projects/hfi/May-2003/hfi-fuels-treatment-graphs.shtml.

Williamson M (2005) Influences on Forest Service district rangers' decision to authorize wildland fire use. In: Andrews, P.L.; Butler, B.W., comps. 2006. Fuels Management—How to Measure Success: Conference Proceedings. RMRS-P-41. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 67–77.