

System Indicators

Fire Threat



**Acres Burned by Fire
Severity and Landscape
Priority for Treatment**

September 2013

Acres Burned by Fire Severity

Not only is fire size important in measuring the impact of fire on the watershed, but the severity at which the fire burns and the amount of area burned at a high-severity is just as important.

Measuring and Reducing Fire Severity

Complete elimination of severe wildfire is not desirable, but current forest conditions lead to large fires dominated by high-severity burning with unwanted consequences. Varying levels of burn severity within a fire help create or maintain a mosaic of ecosystem habitats and corridors, but when large areas burn with high-severity it not only destroys or eliminates critical habitat, but creates erosion and water quality problems as well, and provides for the introduction of non-native and invasive species further changing the habitat from the pre-fire regime. Low intensity fires tend to remove fuel and thin vegetation and generally reduce competition for nutrients and water and reduce insect and disease populations. The mosaic of disturbances created by a variety of burn severities within a fire more closely mimic historic natural fire occurrence.

A USFS report, Sierra Nevada Fire Severity Monitoring 1984-2004 (Miller, Safford), documents that there has been an increase in the proportion of acres burned at high-severity in most of the fires experienced on USFS lands in the Sierra Nevada during the survey period. Overall, 14 percent of wildfire burned at high-severity in 1984, while 23 percent of fire area was at high-severity just 20 years later. Different forest types exhibited varying levels of change in fire severity over the 20 year period. The proportion of severe fire in mixed conifer stand fires increased from 17 percent to 27 percent; while severity in white fir and black oak stands increased 200 – 300 percent, and there was no appreciable increase in fire severity in low-elevation west side Ponderosa pine and high-elevation forests.

While burn severity within a fire perimeter has been documented and measured in this and other studies on some lands, currently a consistent methodology and data set is not available to provide a Region-wide indicator related to fire severity. CAL FIRE is currently developing a methodology to consistently measure burn severity within the fire perimeter on all fires above a certain acre threshold. The SNC will continue to work with CAL FIRE and the USFS to develop a uniform database of fire severity on all lands in the Sierra Nevada, by forest type, ownership category, and level of severity, so that trends in fire severity can be comprehensively tracked over time.

Fire Return Interval and Fire Severity

As discussed in the SNC Forest Health and Carbon Storage Indicators report, the Fire Return Interval Departure (FRID) shows that the frequency of fire return has a great deal of bearing on fire intensity when fires do occur. The fire return interval prior to European settlement (before about 1850) averaged 20 years or less on 75 percent of the forest lands in the Sierra Nevada, whereas 75 percent of the forest has not experienced fire in the past 103 years. The lack of periodic low-severity fire on the land allows forest fuels to become overstocked so fires burn

more intensely when they do occur. As forests and vegetative cover gets denser there is more competition for moisture and stands get thicker with increased mortality and dead standing and ground fuels.

Landscape Priority for Treatment

As discussed in the Forest Health and Carbon Storage Indicators report, CAL FIRE has identified watersheds with a high potential for risk of damage from severe wildfires. They identified that the North and North Central Subregions have areas with the highest threat to watershed health in the event of a high-severity fire. High-severity fires on the landscape have the potential to have dramatic impacts of watershed function including sedimentation rates, and changing micro climate by burning up litter, roots and other organics exposing soils to erosive precipitation. The larger the areas burned under a high-severity condition, the higher the potential for damage to the ecosystem. Where infrastructure is located in or near these watersheds there is also significant risk to those improvements and assets.

Treatments in these watersheds can be performed in a number of ways and there is no one-size-fits-all approach, though there is general agreement that the ideal situation would be the return of more frequent low intensity fires that would approximate historic conditions. Prescribed fire is the most economical way to maintain low or more historic fuel loads, as well as return to more historic fire regimes, but there are a number of factors that make this extremely difficult. Infrastructure and homes built in the wildland areas make it more problematic to conduct burns in these areas. It has also been difficult for land managers to schedule prescribed burns in a “burn window” where the fire will burn to get the desired results and still comply with air quality restriction or limitations. Potential liability in the event the prescribed fire escapes is also a serious consideration. In many instances, prior to introducing fire to the landscape, the heavy fuel loads of overstocked forest stands due to long-term fire exclusion would require some mechanical thinning of biomass before fire could be reintroduced to those areas. Steep terrain and other sensitive areas can even require hand thinning. These mechanical and hand treatments are expensive.

Shaded fuel breaks can complement general forest thinning and help control the potential spread of wildland fires, and is particularly important in protecting communities from catastrophic wildfire. An understanding of fire threat and fire severity history can aid in strategically designing and locating fuel breaks. There are many areas in the Sierra that have developed Community Wildfire Protection Plans (CWPP) that identify priority areas or actions to reduce the potential for large damaging fires, but coordinating across ownerships has been difficult for many communities due to a lack of funding or coordinated timing for available funding to either start or finish a project.