A FOREST MANAGER'S EXPERIENCE OF THE EVOLUTION AND ROLE OF FIRE IN WILDLIFE MANAGEMENT IN THE MIXED-CONIFER FORESTS OF THE CENTRAL SIERRA NEVADA

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A current trend in forest management theory is the restoration of our forests to vegetation patterns that existed prior to European settlement. A primary factor affecting pre-settlement vegetation patterns was natural fire. However, there seems to be disagreement within the ranks of professionals as to how fire affected vegetation and wildlife prior to settlement.

Through extensive research we now know a great deal about fire behavior. Flame length, rate of spread and depth of burn are just some of the scientific measurements forecasted and used by professionals. Furthermore, research now allows us to quantify fire behavior in natural settings. Yet despite these gains, it is fairly difficult for some to understand pre-European settlement vegetation patterns.

If we apply practical knowledge to technical fire behavior, we can at least describe naturally-occurring fire patterns. Fire burn patterns exist in many forms. The most severe is a "blow-up," when under extremely dry conditions and high fuel buildup, a forest fire literally explodes out of control. The least severe is a "meandering fire," when under relatively cool, moist conditions, a fire burns slowly for days, covering large areas without reaching the overstory.

Many people view pre-European forests as exhibiting a vegetation structure resulting from the "meandering fire," in which trees are fairly well-spaced and have little or no understory or brush cover. In fact, this type of structure, or any other single vegetation structure (old growth included) probably each accounted for less than 25% of the vegetation cover found within the mixed-conifer forest type at any given time. Also, because of the randomness of natural fire, forest stands did not always go through the entire successional sequence to reach the old growth seral stage. This is evidenced by the numerous fire-related pioneer species that occur at all of the seral stages. Thus, natural fires would burn some acres frequently without touching adjacent acreage for many years.

To develop management strategies to re-create pre-European conditions, we need to fully understand how natural fires burned and their results. For discussion, let's hypothesize a small fire that began with lightning on August 29, 1661, at a location now encompassed within the borders of Fresno County. Other conditions included rainfall of only 0.1 inch during the storm, an elevation of 5,100 feet, and a starting location just below a slight rise in a major ridge. This fire then burned for 29 days over 2,500 acres under changing conditions: hot and cold, night and day, up slope and down slope, with and without wind, and under sunny and overcast skies.

Although hypothetical, fires similar to this would have occurred sometime, if not many times, since the last glacial period. The fuels it consumed were also quite variable given the forest structure, ranging from fine material such as needles, to downed trees. This scenario follows the theory that forest ecosystems developed through numerous natural disturbances. This process would evolve species able to adapt to changing conditions, including fire.

Such natural fires result in a highly variegated mosaic of vegetative cover. Some areas burned frequently and thus developed light fuel loads, while other areas may have escaped fire for many years and developed heavier fuel loads. These infrequently burned areas were then susceptible to hot fires that consumed all vegetation. Even with the introduction of fire by native americans, the patterns would not have been greatly altered, because fire was already a part of the natural system.

European settlement began in the 1700's. Within a hundred years after the arrival of the first settlers, we had in addition to Native Americans and lightning as ignition sources, the presence of ranchers, miners and loggers throughout the forest. Although more people as well as machines increased the risk of fire, forest vegetation was still typified by prior decades of natural fires. Thus, European settlement by itself did not significantly impact the natural forest structure.

Vegetation patterns began to change around 1900 with the introduction of fire suppression laws. The resulting changes in vegetation patterns were far more dramatic than all the natural cycles of the previous millennia.

At present, many resource professionals as well as the general public want to return our forests and wildlands to a semblance of their natural condition while providing the necessary resources for our country. Fire is one of those management tools that must be used by natural resource managers to achieve the desired conditions.

I promoted the use of fire in 1961, then an extremely unpopular stance. To be an advocate of fire, much less a practitioner, invited ridicule. Despite this sentiment, I used prescribed fire on small ownerships in the central Sierra's throughout the 1960's and 70's, in one case on property previously burned by Dr. Harold Biswell in the 1950's. Wildlife habitat improvement was not an objective of those early attempts at burning. However, even then I was beginning to observe certain wildlife responses that resulted after burning. One such response was the increased

sign of deer use because of the improved browse conditions from new sprouting.

I was able to expand my burning activities when I went to work with Southern California Edison in 1979, even though managed fire remained politically sensitive and relatively unknown. My prescriptions began with a written outline of goals and how I hoped to accomplish them through the use of fire. However, most managers of prescribed fire would not call these prescriptions, because I defined prescriptions not as methods, but as statements of end goals.

My prescriptions are categorized into three types: 1) hazard or fuel reduction, 2) seed bed preparation and 3) wildlife habitat improvement. Burning for hazard reduction could be troublesome because of the chance of escape and resultant litigation, especially for a company with deep pockets such as Southern California Edison. Burning for seed bed preparation was considered non-significant, because of professional and public perception that it was not essential in the reproduction of natural forests. However, burning for wildlife was acceptable, because promotion of wildlife was perceived as good. Therefore, to say that I was burning for wildlife became politically safe, even though "burning for wildlife" was never defined. Wildlife habitat projects enabled me to proceed with the use of fire. Deer, in particular, were my greatest allies, as the benefits from fire were chronicled, at least in the ranks of the California Department of Fish and Game biologists at that time. Without this support, the Company would not have let me burn.

When using prescription burning for wildlife, I try to create a mosaic of vegetation patterns that I perceive as "natural." Mid-winter is the best time to achieve desired results, given an elevation of approximately 5,000 feet and the central Sierra's mixed conifer type. Some of the advantages are: low fire hazard, snowbanks and other barriers for firelines, ability to use slope to increase heading fire intensity, and less stringent time demands and associated costs for monitoring the fire. Fire is introduced to areas of the forest, creating small openings in the vegetative cover. Wind and slope, used in combination with various fuel loads, create relatively hotter fires in desired small areas. A different pattern of ignition may be, and usually was, used each day. Knowledge of constantly changing weather conditions, terrain and fuel loads are required for a successful burn.

I discovered plantation burning in 1981. The standard practice for managing competition in plantations consists of cutting and leaving large amounts of slash beneath established trees. The large amount of fine fuels from these cuttings jeopardized the investment in the plantation. Instead, I reduced these fuels by fire. Some cover remained, and brush sprouting was induced. The threat of potential wildfires was reduced, and the sprouting of the residual cover promoted an excellent food source for deer.

I have treated approximately 7,000 acres with fire since 1979. Note the word "treat." Treated acreage includes areas burned at periodic intervals, and areas where the actual acres burned are as low as 50% of the total acres treated. Those unburned areas are as valuable as the areas burned, in that they increase the habitat diversity of the area. The introduction of periodic burning depends upon need, which includes the degree of recreational use, fuel load, and past fire behavior on the area. The only prescribed burns that I am unable to perform are "hot" fires and in-season burns because of political reasons and the liability they may incur.

In conclusion, the use of managed fire for wildlife habitat enhancement is necessary in the central Sierras. Fire must be introduced in such a manner that the temperature and amounts of fuel consumed vary significantly over the area treated. The results within fire-treated areas include an increase in vegetation types, the introduction of pioneer plant species, resprouting and increased growth of burned vegetation and a concurrent increase in wildlife population and species. The area burned is significantly less than 100% of the area undergoing treatment. Thus, unburned areas within the treated area perimeter provide additional cover and nesting sites, allowing for a broader range of wildlife species. Finally, periodic burning is necessary to maintain the desired vegetation structure. The regularity of burns depends upon need, which includes the amount of fuels present, and past fire behavior.

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