

Responses to V. Jurskis (continued)

2 Fire in the eucalypt forest

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It is inevitable that people will have widely differing perceptions of the eucalypt forest – fire relationship, including the role of fire in the evolution of the eucalypt, the frequency and intensity of fires before European settlement, the flammability of present day forests, and the extent to which managed fire may be justified in ecological and social terms. This response to Jurskis (2000) presents one perspective the forest-fire relationship. It is based on concepts previously presented by the writer (Florence 1994).

Species and community patterns in the eucalypt forests

It is useful to start by appreciating the nature of the eucalypt forest. Species and community patterns may have their origins in the evolutionary processes which generated adaptation of eucalypts and eucalypt forests to a number of environmental stresses. Initially these included climate change associated with continental drift, declining soil fertility associated with massive erosion and laterisation of soil, and, later, declining rainfall, increasing drought and fire frequency. Against this background, the mosaic of species and communities characterising the present-day forests may be a product of the ‘ecological sifting’ of a large number of species (both eucalypt and rainforest) by site factors, particularly the physical properties of soil and the availability of water and nutrients. Fire is seen to play a secondary role – though it is appreciated that the emphasis placed on site and fire, respectively, in interpreting vegetation patterns will probably always be a matter of personal interpretation.

The condition of the eucalypt forests at European settlement

When the Europeans arrived much of the eucalypt forest (including present-day tall forest with a shrubby rainforest element understorey) had, by many accounts, a ‘woodland structure’, that is tall-boled, wide-crowned, widely spaced trees with an open, and often grassy forest floor.

It is widely presumed the grassy forest floor was a function of regular, light burning by Aborigines – and undoubtedly this was a contributing factor. However, the forest condition may also be attributed, in a more fundamental way, to the biological attributes of the eucalypt forests, and natural successional processes in them.

Where an intense fire kills or critically weakens groups of trees in an old-growth forest, there may be profuse development of both eucalypt seedlings and shrub (understorey) species. As the eucalypt regeneration gains height, self-thinning will begin, rapidly at first and then more slowly, and continue until segregation into wide-spaced trees is complete. There will also be a rapid decline in the density, diversity and cover of understorey shrubs, and eventually, their replacement by a largely grassy forest floor.

The processes by which a fully stocked overwood controls the understorey may be related to those attributes which enhanced the eucalypt’s adaptation to low nutrients and drying soil in the first place. The eucalypt conserves foliar nutrients within the biomass through efficient withdrawal of nutrients from leaves before they fall as litter. With the eventual incorporation of the more refractory component of the litter into the soil organic matter, limited microbial energy sources can restrict nutrient mineralisation and create a soil biological environment directly inhibitory to plant development. This can lead to a decline in the understorey.

While there is scientific evidence to back this up, it may not be a new concept! To quote from the explorer Charles Sturt (cited in Ryan 1993/94):

“...it has been obvious to me...that in New South Wales, the fall of leaves and the decay of timber, so far from adding to the richness of its soil, actually destroy minor vegetation...Thus it would appear, that it is not less to the character of its woods than to the ravages of fire that New south Wales owes its general sterility”.

The decline of the understorey will also be related to the eucalypt’s water use characteristics, including a capacity to compete strongly for soil water in limited supply. The trees may dry out the surface soil, and then depend on root systems which can tap water at depth. Unless the understorey plants are particularly drought resistant, they may begin to succumb as the rapidly developing stand reaches a point of peak demand on soil water and nutrients, that is around the point of peak volume production.

The combination of strong site control in this way, and periodic light fire, would not only have maintained an open understorey before Europeans arrived, but also helped create and maintain more or less distinct boundaries between open forest and rainforest (or a rainforest element understorey) where rainforest occupied gullies and lower slopes. Based on this hypothesis, it follows that wildfires of sufficient intensity to destabilise forest ecosystems on a large scale were not common in pre-European times.

The impact of wildfires following European settlement

As settlement spread out through the coastal forests and along the valleys, the surrounding forest was regularly burned to protect cleared land from wildfires, to enhance access, to provide relief grazing, and so on. Sometimes these fires became major conflagrations which did considerable damage to the forests as a future wood resource.

Consequently, few forests (including virgin forest in national parks and wilderness areas) can be said to be in a natural condition – where ‘natural’ refers to the forest condition at European settlement. There may now be greater structural and

floristic diversity, a generally incomplete and irregular upper canopy, residual and often deeply fire-scarred old-growth trees, patches of regrowth trees in varying condition and stages, a now persistent shrubby understorey relatively free of strong overwood control, and a greater range and accumulation of forest fuels than characterised the pre-European forest.

The reduction in canopy site control would also have altered the relationship between eucalypt forest and rainforest. Rainforest element species with wider environmental tolerance were now able to expand beyond their lower slope limits, creating a more or less continuous secondary shrub stratum. There are many who attribute this simply to the policy of protecting forests from fire. However, while protection certainly is a contributing factor, the changed condition might be seen primarily as a response to the destabilisation of forest ecosystems by intense fire, logging or both.

The use of fire as a management tool

It will now be unrealistic to attempt to use fire to return eucalypt forests to the pre-European 'open forest' condition, particularly where subject to periodic selection harvest. Because many understorey species (including rainforest element species) will regenerate following fire, both through coppice and seed, regular and moderately intense fire at short intervals would be necessary to remove them. This may not be feasible on a wide scale given the considerable variability in seasonal (burning) conditions, operational costs, damage to growing stock, conservation objectives, and other social and environmental constraints. Nevertheless, fire must remain a critical tool in the continuing management of eucalypt forests.

Modern resource management is essentially about balancing a number of often competing objectives. In this sense a fire management strategy might take account of the four principal objectives: (i) protection against wildfires - through strategic fuel reduction burning; (ii) conservation of biological diversity - through either complete protection or use of fire of varying intensity to maintain habitat for specific plants and animals; (iii) maintenance of full site stocking and supply of wood to industry - through regeneration burns; and (iv) the maintenance of healthy and dynamic forest ecosystems - through use of fire to stimulate soil biological and plant successional processes and help avoid stand stagnation, soil biological problems and insect predation.

References

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