

Assessment of the Requirement for Rehabilitation of Areas Adjacent to Marysville that were Burnt in the Black Saturday Fires

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1.0 Background

In early March this year, Andrew Forrest contacted Alan Cransberg to see if Alcoa could assist with an assessment of forest areas burnt in the Black Saturday fires to recommend whether rehabilitation of these areas would be required or if they were likely to regenerate on their own. This request was passed on to me as the Mining Environmental and Community Manager with experience in fire ecology and mining rehabilitation. After contacting Mal James from the Australian Children's Trust, I was put in touch with Graeme Brown from the Marysville and Triangle Development Group. Graeme assisted in organising a visit to the region on the 12th and 13th May. I have attempted to summarise my findings from this visit below in a relatively non-scientific way so that this report can be distributed to a wider audience. However, I do believe that it is important that I first explain the broad methodology that I utilised to undertake the assessment which I have adapted from some of my previous journal publications and tried to explain in lay person's language. Following my explanation of the methodology, I outline the sites that I inspected, followed by recommendations from the assessment, other observations and comments, and conclusions and acknowledgements. As indicated to Graeme Brown, I am available to make further comments on these observations and recommendations as required.

2.0 Methodology for Assessment

During site inspections undertaken in Marysville Shire on the 12th May, I attempted to classify sites according to whether I believed they had crossed one or two thresholds (see Figure 1). This methodology has been previously published in the international journal *Restoration Ecology* (Grant 2006). I have attempted to simplify the model and adapt it to the Marysville wildfire scenario.

The first threshold is known as the biotic threshold. Sites that are disturbed (e.g. by a severe wildfire) may cross this threshold and therefore require some form of biological intervention such as planting, seeding or weed control (see category 2 above). Sites that do not cross this threshold have sufficient inbuilt resilience to recover on their own (see category 1 above). The second threshold is known as the abiotic threshold and sites that cross this threshold will exhibit significant changes to the environmental conditions that exist in the area (e.g. erosion of soil). Sites that cross this threshold will require significant intervention such as earthworks to repair erosion scours (see category 3 above) before the vegetation will be able to recover to

its pre-disturbance form. Sites that fall into category 3 are also likely to require biological intervention.

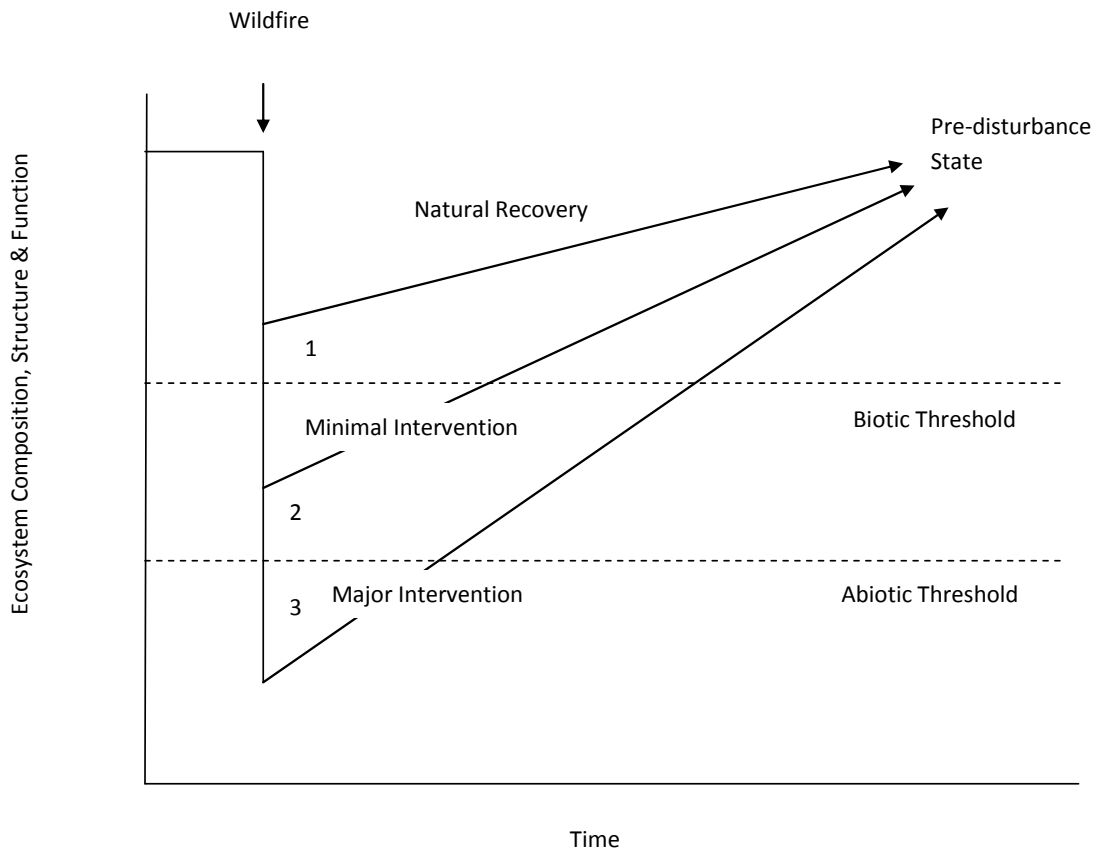


Figure 1: Process used to assess burnt sites surrounding Marysville that fall into one of three categories (numbered 1-3) depending on whether they have crossed the biotic or abiotic threshold.

3.0 Inspected Sites

I inspected Bruno's sculpture garden and adjacent riparian areas, Steavenson's Falls and River, and various areas along Lady Talbot Drive. I assessed these areas according to the procedure outlined above. While I wasn't able to assess all areas within the Marysville Shire, I believe that I did see a range of sites that represented the full spectrum of fire intensity. Remote sensing techniques could be utilised to undertake a more comprehensive assessment. Areas could be categorised according to the recommendations below based on fire intensity and their proximity to Marysville and then ground-truthed.

4.0 Recommendations Following Assessment

4.1 Category One

It is my opinion that the majority of these areas do not require direct rehabilitation intervention at this stage (category 1). While the response of the overstorey varied between sites based on species composition and fire intensity, at all sites the majority of fire tolerant species were observed to be resprouting from epicormic buds and there appeared to be little evidence of stem death at the top of the crown (see Figure 2). It is well known in fire ecology that the resprouting response of trees tends to be much slower and less vigorous following summer/autumn than spring burns regardless of fire intensity. This is the most likely cause of the delayed and less vigorous resprouting response of the fire tolerant overstorey species (independent of fire intensity).

The tree species that are known to be fire susceptible (e.g. mountain ash) had been killed as expected (see Figure 3), but there was already significant evidence of recruitment of seedlings under dead parent tree. There are potential silvicultural management techniques that could be used to accelerate the successional development of these areas (e.g. thinning) but these operations are likely to be expensive and would need to be applied over a broad area to be effective. The fire has impacted on large forestry coupes and this will lead to a decrease in area available for logging of fire sensitive species after the salvage logging operation has been completed because there will be a large area of relatively even aged stands. Selective silvicultural management should be considered to assist in accelerating the growth of trees in selected coupes.



Figure 2: Fire tolerant species exhibiting significant resprouting with little canopy kill back.



Figure 3: Fire susceptible species located in a valley that were killed by the fire.

There was already significant evidence that the understorey as well as the overstorey was recovering after the fire. Many species (e.g. tree ferns) were observed to be resprouting (see Figure 4) and many recruits from seed were also observed. One risk in relation to the understorey composition and structure is that the very high intensity fire will lead to a proliferation of legume species that have hard seeds that are stimulated to germinate following high intensity burns (see Figure 5). Areas should be monitored for this but the most effective management tool tends to be a low intensity fire in spring to kill the fire susceptible parent plants and not encourage the recruitment of seedlings. These cool burns should be undertaken as soon as the legume species begin to senesce.



Figure 4: Tree ferns resprouting at Bruno's sculpture garden.



Figure 5: An example of significant recruitment of native legume species in rehabilitated areas burnt at very high intensity in Western Australia.

4.2 Category Two

The only areas that I directly observed that I would regard as crossing the biotic threshold (i.e. category two) would be areas burnt at very high intensity in close proximity to the township that previously contained significant weed populations (see Figure 6). Weed species such as blackberries are likely to proliferate after a fire and an opportunity exists to control these species while access is relatively easy. I would suggest that the Shire investigates whether conservation volunteers could be engaged to undertake this work. The window of opportunity is likely to be 6 to 24 months post-burn. Following this time, access and the amount of weed biomass is likely to be prohibitive.



Figure 6: Example of very high intensity fire in a riparian zone that was previously known to contain a significant weed population.

4.3 Category Three

The biggest risk that I could see was the potential for erosion if high intensity rainfall events occurred. If this does occur, these areas would be regarded as category three. It was indicated that there had yet to be many high intensity rainfall events this winter. Regardless, I did observe some erosion gullies adjacent to Steavenson's River on the way to the Fall's. If the area was to receive a number of high intensity rainfall events there may be significant potential for erosion and this would need to be assessed on a regional basis. This erosion would be likely to have a major impact on water quality. However, at this stage there did not appear to be any requirement for direct intervention and the area of erosion that was observed was not severe. The affected area is too great in extent and it is too difficult to predict the highest risk areas to consider preventative erosion measures. The shallow nature of soils in the area may reduce the potential for significant erosion scours. If significant erosion does

occur over the coming winter, these sites would be regarded as category 3 and may require significant intervention including major earthworks (see Figure 7).



Figure 7: Eroded rehabilitation area (left) and the same area following erosion control works (right) in Western Australia.

5.0 Other Observations and Comments

- As suggested by Graeme Brown, I agree that there is a lot of potential for the Marysville region to create a post wildfire vision for their Shire that focuses on sustainability. This will largely complement the traditional tourism, timber (value adding) and agricultural land uses (hydroponics) but may create other unique social and business opportunities. I indicated that I would be willing to provide input on sustainability objectives to the Marysville and Triangle Development Group. I have already provided some examples of sustainability objectives that have been used by Alcoa.
- The regrowth of areas containing a high proportion of fire susceptible species is likely to be vigorous and this will impact on the quantity of water that is likely to be yielded from these catchments. In the short term, the quantity of water is likely to be higher as the fire tolerant species re-establish a canopy and the fire sensitive species recruit from seed. As mentioned above, water quality may be an issue during this period depending on rainfall patterns. Once the fire tolerant and sensitive species have re-established a significant canopy, their water use is likely to reduce the amount of yield from these catchments until the fire sensitive species naturally self thin or there is silvicultural intervention. These patterns have been observed previously following significant fires in the eastern states of Australia. As mentioned above, active silvicultural management of selected areas should be considered.

6.0 Conclusions and Acknowledgements

It is my opinion that the majority of forested areas in the Marysville Shire will recover without rehabilitation intervention. This is a testament to the resilience of these forested ecosystems to very high intensity fires. The unknown at this point in time is the potential for significant erosion and this will need to be monitored over the coming winter. I would like to take this opportunity to thank Graeme Brown for his hospitality and to offer further assistance if this is deemed necessary. This was an overwhelming experience for me and I was amazed by the positive attitude of local residents and the generosity of volunteers in the face of such a tragedy. I wish the people of Marysville and surrounding areas all the best as they live through what is going to be a long and tough recovery period.

References

Grant, C. D. (2006). State-and-transition successional model for bauxite mining rehabilitation in the jarrah forest of Western Australia. *Restoration Ecology* 14: 28-37.