To : The Prime Minister's Department ,
Parliament House
Canberra ACT

From : Stafford Ray,

Re Bushfires.

In response to the call for submissions on what can be done to avoid major bushfire damage. My credentials are Volunteer Rural fire fighter for many years and an ex-captain of the Wollombi Bushfire Brigade.

My experience showed that there is no simple and cheap answer that will totally protect people, property, forests and wildlife from very severe fires that occur when conditions become as severe as they did this immediate past Summer.

However, something needs to be done and I would like to offer my ideas.

Firstly let me list some facts about forests, fires and wildlife.

- Mature forests that have not been burnt for some time develop a full canopy that shades out almost all undergrowth.
- These forests have a clear floor that is covered in leaf litter with the occasional fallen branch.
- For the most part the leaf litter prevents capillary action so that the soil under the leaves for the most part remains damp. Leaves in this environment decay quickly and are absorbed into the top soil.
- Wind velocity at ground level is a fraction of the velocity at the canopy.

Forests that can be preserved in this state do not burn readily. Some tree species carry flames to the canopy from the forest floor, but most have smooth upper limbs that do not catch easily. In a significant numbers of fires, it is mainly shrubs found in new growth and recently burnt forests that create the heat at the lower levels that carry heat and up to the canopy

- Forests that have been cleared or burnt have a very flammable lower storey, mainly small leaf shrubs.
- These include species that rely on fire for their seeds to germinate, but they are perennials so do not need to occur fire often to replace dying individuals.

Forests that are burnt regularly have a high population of shrub species. These forests create a high level of fuel that is highly flammable between the ground and the canopy. Leaf litter is not absorbed readily due to low populations of insects, small animals and fungii.

In other words, a burning regime that burns all forested areas, but burns irregularly, usually after fuel has developed to the point where it becomes hazardous, recreates the most severe conditions for wildfires.

Questions for government include.

- When to burn to lower the fuel load and how much to burn.
- How to balance the need to reduce hazardous fuel levels and the need to maintain growth and security for animals and plants to maintain a healthy wildlife population.
- How to politically balance pressure from those stakeholders who promote burning and those stakeholders who oppose it. I believe both extremes are right, and the following plan can satisfy the needs of both groups and those in between.

A few facts not always appreciated.

- Wildfires destroy wildlife. Some species can outrun a wildfire, so those that do not are destroyed. It takes many years for the full spectrum of wildlife to recolonise (if ever) in a severely burnt area particularly if it is a large area. The wider the area burnt the further away are sources of individuals that can breed and eventually repopulate. Some areas are so often burnt that the full range of species is never replaced.
- Back burning traps wildlife between fire fronts resulting in a more complete wipe out of species than naturally occurring single front fires.

I do not intend to leave you with these questions, but will in the conclusion offer a plan that just might be able to satisfy all stakeholders and protect wildlife.

Some myths that colour the debate.

- "Indigenous Australians burnt the forest regularly, so it must be OK".

This is a myth we hear from proponents of regular and widespread "hazard reduction". In fact Kouris burnt quite small areas at a time. The main purpose was to create small areas of "green pick" that would attract game animals so they could be surrounded and speared easily. To burn a huge area would be counter productive, both reducing wildlife numbers, increasing the area over which they would need to hunt.

- Many species need fire to germinate. True, but they do not need fire often as all of these species are perennials. Some species, in particular some acacia species produce high protein seeds that supply grain for flour, and toward the end of their lives become host to the famous witchety grub. If acacias are burnt too often, they do not host witchety grubs, and in really hot wildfires, the seeds on the trees are burnt along with the foliage and small branches.

Basically Aborigines were farmers. They managed and controlled the plants and animals that supported them, not as we do with fences and sheds, but by understanding them and manipulating them often with the use of controlled burning that created manageable mini habitats. The wider forest was always the source of resupply. The long term survival of species of wildlife and plants was protected by customs.

There is one serious and unfortunate legacy of firestick farming and that is soil depletion. This country is generally deficient in the flammable elements phosphorus and sulphur. When leaf litter is burnt, these elements, mined from the sub soil by tree

roots and dropped as leaves are carried off in the smoke. Each burn removes most of the flammable elements in the leaf fall since the last burn. However, in the short to medium term this is not the worst outcome. The worst is the loss of the leaves themselves in situ and what they do for the trees.
When the leaves are left on the ground, they act as a mulch to

- Keep moisture in the soil.
- Encourage a high degree of bacterial and fungal activity in the leaf litter and in the soil itself. This activity is aided by small animals and insects that live in the litter and by worms and other creatures.
- When litter is burnt, these organisms are burnt also, and it takes a long time for recolonisation.
- A high level of activity in the litter causes litter to be integrated into the soil very quickly leaving less to burn when a fire does happen. Also, as most of the organic matter, between the occasional burns that do happen, is bonded into the soil, which is also more moist than regularly burnt soil, more organisms survive, roots stay cooler, and regeneration begins immediately.
- In this situation, the rate of growth of trees is accelerated and the canopy becomes continually higher, making canopy fires less likely.
- Regular "hazard reduction burns" therefore assure that there is a high level of fuel that is available to burn. They deplete the soil and destroy plant and animal populations.

The challenge as I see it is to:

- Protect property by setting up a management structure that has the capacity of managing outbreaks by limiting the area over which a wildfire can travel before meeting a reliable and defendable barrier.
- Ensure the survival of fire dependant plant species by ensuring that fires occur often enough to ensure their regeneration.
- Encourage native animal species to flourish in fire free environments.
- Encourage the growth of native species, particularly trees at the greatest rate possible.
- Protect the fertility of soils.

The plan.
Basically this idea is designed to create a grid made up of strips of land that are burnt very often between much larger tracts that are never purposely burnt. These narrow strips become fire breaks, while the larger tracts are used for normal purposes such as farming, native and plantation forests and natural reserves. The grid needs to cover all areas that have been shown or are deemed to be in danger of burning in a wildfire. Areas considered will include pasture and crop areas in addition to forests.

The detail.

- Augment the fire trail system so that a grid exists. In other words all fire prone land needs to be sectioned so that no inflammable area is continuous.
- The fire trails pass on both sides of each of the narrow strips. These strips are continually burnt.
- The areas between are never intentionally burnt.

- A fire trail long every border must be kept totally clear of vegetation. This may mean spraying or in some cases regular mowing, and in some cases the use of public roads as borders.
- This needs to be particularly so along the path of most wildfires, ie. In New South Wales coastal areas, from the Northern and Western sectors,
- The narrow sectors become firebreaks in dry times and need to be wide enough to fully buffer a wildfire coming from its adjoining sector.
- All firebreak sectors, that is every second sector is burnt as often as necessary to make its vegetation as near to fire proof as possible.
- Other sectors are never burnt allowing the forest to develop a full canopy and shade out any second storey, plus develop a ground level mini climate that retards fire, retains moisture, encourages growth and protects natural species and soil fertility.
- The same pattern is applied to grassland and fire-threatened cropland, so "fire proof" strips of burnt grass surround all areas of dry grass.

What happens in a bad fire season.

- A fire starts or is started anywhere in the forest. As it is unlikely to burn in a recently burnt sector, it will most likely be in a never burnt sector.
- A backburn is laid along the other sides of the sector so the fire is contained in that sector. Firefighters then always have a nil to low fuel load sector at their backs. This "barren" area limits the effects of spotting, makes it easier to control a fire in that area and provide escape routes for fire fighters.
- Regeneration is rapid. The fire can only completely burn out one non-burn sector leaving surrounding populations of plants and animals intact. This includes herd and domestic animals that can escape from heavily dry grassed areas to the burnt strips and beyond.
- When the fire is out, the distance to sources of re-population and regeneration is short.
- Species that rely on fire are encouraged to flourish within the constantly burnt buffer zones, and will temporarily populate old forests in those sectors that do burn form time to time.

Expense

Burning of the to-be-burnt strips sections needs to be done at least once per year and this costs. How much it costs I do not know but I am sure it can be estimated.

The slow and cool nature of these burns allows fire fighters to light one side only so wildlife can leave the area, or burrow or if it is able and in any case, the heat does not get far into the soil so most organisms there will survive anyway.

Wildlife in the old forests is not threatened and will flourish and will repopulate burnt areas immediately the green pick shows.

We need a broad area, perhaps state wide approach to the problem and it will not be cheap to implement, however, the cost of wildfires to individuals and to the community is immense. The balance sheet must contain cost of man hours for equipment and fire fighters used in prevention against those used in hot fire fighting.

Add to that the added cost of increased insurance plus the cost of the arsenal of fire fighting equipment needed when extreme conditions do happen.

Such a systematic approach and a major investment in prevention may be the only way to avoid the terrible events we have just witnessed. In the end, we may be forced to do more to prevent wildfires if carbon dioxide released from wildfires is ever added to our greenhouse gas debt.

Thanks for the opportunity

Yours

Stafford Kay

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