THE HOWITT SOCIETY INC

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Submission to Inspector General for Emergency Management Inquiry into the 2019/20 Fire season

From ; The Howitt Society Inc

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Executive Summary

Whilst State and Federal bushfire inquires primarily focus on Response and Recovery to bushfire, this submission addresses one aspect of Preparedness – the management of forest fuel loads.

Bushfires have been and will remain a significant component of the Australian landscape. Since the available forest fuel determines the amount of heat that potentially can be released in a bushfire, low intensity burns to reduce the fuel loading in a forest (fuel reduction burning) are one action that can be taken by land managers to influence the one component of fire that can be modified to reduce fire risk.

Recent fires across the landscape have been broad in extent and intense. Many could not be contained even with the increasing amount of on ground machinery and aircraft that were available.

Widespread fire across the landscape is a threat to local communities and the natural environment. Current approaches to fire management are delivering periodic mega fires which destroy infrastructure, kill and maim citizens, impact their livelihoods and do irreparable damage to the environment.

Reducing fuel loads is a key to improved outcomes with wildfire. Whilst a large scale fuel reduction burning (FRB) program will not stop fires it will create a mosaic of burnt and unburnt country of varying ages which will reduce fire intensity, making it more likely that firefighters can contain fires before they impact on people, property and a range of environmental values.

To be effective, the broad scale FRB program needs to treat between 5% and 10% of the forest area annually.

We have a choice. We can continue with the current policies and at regular intervals have large intense fires with the resulting loss of life, assets and ecosystems or we can work with nature and reduce fuel loads over large areas of the forest.

The arguments against a broad scale FRB program need to be weighed up against the option of doing nothing and having whole ecosystems destroyed and the loss of lives and assets.

The irony is that to refuse to burn large areas of forest in a mosaic planned manner eventually results in the destruction of whole ecosystems and loss of life and assets in massive uncontrolled infernos. In recent history we have allowed this to occur over and over again.

If land managers do not adopt the need for a FRB program of this size then the question needs to be asked "If we do not try to modify fuels to change fire outcomes then what are we going to do?"

To continue with the status quo is to accept more of the same outcomes with the same impacts on communities, community assets and the environment. More of the same is not acceptable.

1. **An introduction to the Howitt Society**

The Howitt Society is a group of experienced land and fire managers, fire scientists and acknowledged bushmen who are concerned for the health and safety of the Australian bush and in particular fire management. The group formed a little over 12 months ago. A key focus of the group is the increasing fuel loads in the forests and the consequent increased number of large and intense wildfires with their severe impacts on the communities, community assets and the environment.

2. **Introduction**

The forests of Victoria are a national asset but many have been badly degraded by repeated high intensity large fires over the last twenty years. With the prospect of a hotter and drier climate, together with drought impacts, without a change in management the outcome will be more mega fires with their inherent disastrous impact on our communities and all environmental values.

This submission identifies the one major issue which could make a difference to the outcomes of future fires in Victoria - the management of fuel loads through a broad scale fuel reduction burning program.

This submission is one of two from the Howitt Society with the other submission proposing a way forward for the management of fuel using East Gippsland as a model for the rest of Victoria.

3. **Fire Preparedness, Response and Recovery**

Response and Recovery processes are important but are always dealing with the effects rather than getting to the root cause of the issue and then identifying what can be implemented to influence the outcome.

Whilst there is much attention by the media and politicians on increasing aerial fire fighting capacity to help with fire suppression, it must be made clear that after first attack fails aircraft do not and cannot control large scale bushfires. Nowhere in the world has increasing the number of fire fighting aircraft reduced the incidence or extent of wildfire. We do however acknowledge that aircraft have an important role in first attack and in protecting assets and lives particularly at the urban interface.

This submission focusses only on one aspect of preparedness – the root cause - management of fuel loads.

4. **Previous Inquiries**

There have been numerous inquiries after fires in the past including Royal Commissions. One of the common recommendations from those enquiries is the need for fuel management and additional fuel reduction burning.

Recommendation 56 of the 2009 Royal Commission was that "*The State fund and commit to implementing a long-term program of prescribed burning based on an annual rolling target of 5 per cent minimum of public land*." This recommendation was initially accepted by government and DELWP commenced the process to achieve those targets. However in 2016 there was a change in policy in favour of a risk based approach to fuel reduction burning resulting in a drastic reduction in overall fuel reduction by area.

5. **Background – some fire history**

- Fire has always been a factor in the Australian environment and the ecology has evolved around adaptation to regular fire.
- Historically lightning was a regular event (as it is today) and fire was regular and generally low intensity because of the mosaic of burnt and unburnt areas.

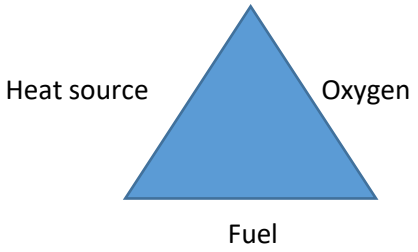
- Aboriginals also used fire and their use complemented the natural lightning and further added to the mosaic of burnt and unburnt areas.
- Generally areas were burnt often but at low intensity.
- The original settlers continued with regular burning.
- More recently fire has been seen as "the enemy" and every effort has been made to suppress fire with minimal attempts to replace it with any other management tool.
- Governments have become more risk averse and wary of large scale burning programs.
- Conservation groups have argued for restriction on the widespread use of burning because of concerns that it may cause damage to environmental values.
- The outcome has been a change in vegetation structure to include a shrubby understory and a gradual build up of fuel across the landscape.

6. Fire Science

Accepted fire science should underpin all discussions about fire in the natural environment

The fire triangle

- The fire Triangle shows that there are 3 components to a fire.
- The only component of the triangle that land managers can influence in the wildfire situation is fuel.



Rate of spread of a wildfire

- If all other factors are equal the rate of spread of fire is proportional to the weight of fuel. (ie double the fuel = double rate of spread)

Fire intensity

- Fire intensities vary and are the product of the heat yield of the fuel, the amount of fuel per unit area and the rate of spread of the fire
- Fire intensity is calculated from the formula I = Hwr where :
  I = Intensity
  H = Heat yield of the fuel
  w= fuel weight
  r = rate of spread of the fire

- So fire intensity is proportional to fuel quantity squared (ie double the fuel = 4 times intensity, 4 time fuel quantity = 16 time intensity)
- It should be noted that the reverse is also the case.
- Fire intensity has a huge impact on the ability to suppress a fire as illustrated by the indicative figures below:
  - ✓ Intensity < 800 Kw/m – direct attack with hand tools supported by tankers usually possible
  - ✓ Intensity <2000 Kw/m – direct attack with machine and tanker usually possible
  - ✓ Intensity>2000 Kw/m – direct attack generally not possible but may control fire with indirect attack
  - ✓ Intensity > 4000 Kw/m – indirect attack required and may fail
- There is a great variation in a fire's impact on the forest, depending upon the intensity. Whereas a low intensity fire may only scorch the leaves of the lower forest crown, higher intensity fires will completely defoliate the entire crown of the forest. Some indicative figures are set out below :

- ✓ Fire intensity <500 Kw /m - upper limit for Fuel reduction burning
- ✓ Fire intensity 500 – 3000 Kw/m – crown scorch likely in many forests
- ✓ Fire intensity 3000 – 7000 Kw/m – Crown fires likely, spotting severe
- ✓ Fire intensity > 7000 Kw/m – Crown fires in most forest types, fire storms at the higher intensities, long distance spotting

Slope

- Fire will burn faster up hill.
- For every 10 degrees of slope the rate of spread will double and hence the intensity also increases.
- It should be noted that the reverse is also the case for fire travelling downhill.

7. **Root Cause Analysis**
   - The large intense bushfires of 2019/20 could not be controlled despite the availability of machinery on the ground and increased aircraft availability.
   - To propose more equipment to try to control the forces of nature is an exercise in futility.
   - What is needed is to attack the problem back at its source.
   - Attached to this submission is a root cause analysis which aims to identify the root cause and what actions can be taken by the land manager to influence outcomes.
   - As highlighted in the fire triangle the only component which can be influenced in the natural environment is the fuel quantity.

8. **Climate change**
   - There is a position taken by some that the root cause of the current high intensity fires is climate change.
   - Long term drought and hotter temperatures mean that fuel is drier and also that there is more fuel is available to burn. More fuel and drier fuel means a more intense fire.
   - Which is the root cause is a "chicken and the egg" argument.
   - What is clear is that nothing that man can do today will stop drought nor change temperature in the short to medium term, so to blame the current fires on climate change is a convenient diversion by land managers who have failed to adequately address the risk to the community and the environment.
   - Additionally to identify the issue and not have any follow up action to address it is an abdication of responsibilities by the land management authorities.
   - Whether the root cause is climate change or increased fuel quantities is irrelevant as the end result is higher quantities of available fuel and hence more intense fires and their effect on the community and the environment.
   - So we must ask what can the land manager do to mitigate the impact of fires on the community and the environment?
   - The clear answer is to reduce fuel loads – it is the only proactive thing that we can currently do to reduce fire intensity.
   - In summary, by reducing fuels we work with nature rather than trying to control nature. The natural scheme of fuel management was regular burning of the vegetation through lightning strikes (and aboriginal burning) creating a mosaic of burnt and unburnt land, so when a wildfire occurred under extreme conditions its forward progress was slowed and the environmental damage was limited.

9. **The case for a broad scale fuel reduction burning program**
   1) Fuel loading in a forest is the only component of fire that can be modified by land managers.
   2) No fuel = no fire, less fuel = lower fire intensity.
   3) The goal of a FRB program is not to stop fires. That would only be possible if all fuel was totally removed from all areas (no fuel = no fire). The goal of a broad scale FRB program is to create a mosaic of burnt and unburnt areas of various ages and reduce the intensity of the inevitable wild fires.

4) FRB can be targeted at areas where fires are most likely to ignite – eg on ridge tops, dry northern slopes.
5) Broad scale FRB across the landscape will reduce the incidence of long distance spotting which occurs when fire intensity becomes extreme.
6) Lower fuel quantities mean that when a fire does start it burns less intensely and it is more likely to be contained at the first attack stage – see photo 1.

Photo 1 - Corringle Rd area south of Orbost 31 December 2019. Spot fire about 15 km in front of the main head fire which was burning under extreme conditions (see photo 3) Spot fire was into an area which was fuel reduced 4 year ago. Fire was easily contained with a dozer line

7) FRBs are planned to be slower and patchier than a bushfire. Not all of the vegetation on the ground is burnt and the upper parts of the trees are largely unburnt. This makes it easier for animals to escape the flames and provides habitat immediately after the fire. Due to the lower intensity of fuel reduction burning relatively low levels of smoke and embers are generated in comparison to a bushfire.
8) A large scale FRB program creates a mosaic of burnt and unburnt country of different ages which is important for species survival. This is in stark comparison to mega fires as seen this year (photo 6) which burn millions of hectares at the same time threatening the extinction of species.
9) FRBs burn the fibrous bark on trees and make them less prone to spotting during a wildfire event – see photos 2 and 5.

Photo 2 - Coastal forest south of Princes Hwy near Orbost. Area fuel reduced 4 year ago. Note the light ground fuels and the fibrous bark which contributes to spotting has been charred

10) Creating a mosaic of burnt and unburnt areas across the landscape gives a strategic advantage to fire controllers when there are multiple fires in the landscape. Those in recently burnt areas can have delayed first attack so that the controller can focus on the priorities.
11) Recovery time for plants, animals and habitats after low intensity FRBs is much quicker than after high intensity bushfire.

10. **The arguments against a broad scale fuel reduction burning program**
There are a range of arguments put forward against a broad scale fuel reduction burning program. Some of them are listed below along with commentary.

1) **FRB does not stop wild fires**
- Much of the debate around the effectiveness of FRB revolves around the fact that many areas which have been subjected to FRB in recent years have burnt again in wildfires.
- In many cases the statement is true. However the goal of a FRB program is not to stop fires, that would only be possible if all fuel was totally removed (no fuel = no fire). The goal of a broad scale FRB program is to reduce the intensity of the inevitable wild fires and assist fire fighters to control them before they become mega fires and minimise the damage to the environment.
- A one year old FRB can stop an intense wildfire –see photo 3

Photo 3 - Painted Line Link Tk north of Waygara - main fire front burning from NW (bottom right) on 31 December 2019 stopped by April 2019 fuel reduction burn – some scorch to vegetation in fuel reduced area for about 20 metres

- A two or three year old FRB can either stop a wildfire or change its characteristics from crown fire to ground fire

Photo 4 - 41/2 Mile Track north of Orbost – main fire front burning from NW (top left) on 31 December 2019 stopped by two year old fuel reduction burn – some ground fuel burnt again in FRB area

- The key issue following a FRB in an area is the lower intensity of any subsequent wildfire, the lesser impacts on the environment and the ability to control the fire.
- The impact of wildfire on an area which has been subjected to FRB will depend on how long since the FRB was conducted and what proportion of fuel was removed during the FRB.
- In some fuel types the FRB has an impact on fire behaviour for many more years – see photos 1 and 2.
- The opponents of fuel reduction burning fail to realise the operational difficulty of fighting a wildfire in extreme conditions. The only option or tool that the land manager has available is the manipulation of fuel in the fire triangle (heat/ignition, air, fuel). There is no question that on extreme fire days fire control personnel would not attempt a direct attack in areas with heavy fuel loads. Even in a fuel reduced area, on extreme days there is no question that fires would burn through those fuels as well, but the moderating effect of that fuel reduction activity is quite profound and is very useful in assisting fire control personnel in the periods of the day when those extreme fire behaviours wane.
- To state that one individual FRB failed because a fire spotted over it or burnt through it demonstrates a lack of understanding of the science of a broad mosaic of burnt and unburnt areas.
- Many houses burn in open paddocks from flying embers that can travel through the air for kilometres. Fires need to be high intensity to create the updraft for these long distant spotting events to occur. Fuel load is an important determinant of creating the fire intensity needed. So if there is a mosaic of burnt and unburnt forest it is likely that there will be less intense fire behaviours and less long distant spotting.

2) The window of opportunity to burn is becoming shorter because of changes in climate

- Whilst changed temperature and climate conditions may/will reduce the 'windows" to carry out FRBs around traditional and historical seasons, they will also open up opportunities to burn into late autumn and winter.
- Whilst it is recognised that in some years weather conditions are not optimal for FRB operations this should not be an excuse to not burn. What is required is adaption to the changing circumstances. For instance :
    - ✓ Retain summer fire crews into the autumn and early winter to provide the necessary labour.
    - ✓ Burn into the evenings instead of during "normal" working hours when weather conditions are too hot.
    - ✓ Burn later into the season.
    - ✓ Burn through the winter in some locations – particularly ridge tops and road edges.
    - ✓ Incorporate a multi stage burning approach for large burn units ie burn ridges and North and West slopes late autumn and South and East slopes early season
- In some situations burning earlier in the season should be considered . There was some excellent FRB carried out as back burns in January during the recent fires in East Gippsland.
- There is normally an opportunity for a fuel reduction burning program to be carried out if the land manager has allocated adequate planning and resources to the program and is opportunist in application of the plan.

3) **Some fuel reduction burns get away and do damage**

- The balance for when it is safe to conduct a FRB is a fine one between hot and dry enough for fuels to burn but not so hot and dry that fire is likely to get out of control.
- Good science and good planning usually get the balance right.
- However when dealing with natural systems it is possible for an unexpected change in conditions and a FRB may break from its planned boundaries. The possibility of a breakaway is part of the planning for a FRB and when something does go wrong all the equipment and resources are on site to deal with it and the damage caused is usually insignificant.

- In rare cases there is more significant damage from a breakaway (eg Lancefield, Wilsons Promontory) and the media report it as though it is the normal outcome rather than an aberration. These instances lead to a more risk averse approach by government. This is an issue which needs to be addressed and there needs to be support for those carrying out a difficult community service. Whilst such damage is regrettable it is insignificant compared with the damage from large high intensity uncontrolled wildfire.

4) FRB kills birds and animals

- Fuel reduction burns are planned to be slower and patchier than a bushfire. Not all of the vegetation on the ground is burnt and the upper parts of the trees are largely unburnt. This makes it easier for animals to escape the flames, and provides habitat immediately after the fire. Due to the lower intensity of fuel reduction burning relatively low levels of smoke and embers are generated in comparison to a bushfire.
- A cool FRB will burn about 70% of the area leaving unburnt refuge areas for wildlife – photo 5 as compared with wildfire – photo 6.

Photo 5 - Recent fuel reduction burn – crowns intact and patches unburnt over the planned area

Photo 6 - Recent wildfire – 100% burnt including crowns. No remaining habitat

5) FRB in recent years have been too hot and have caused damage to the environment

- Some FRBs in recent years have been hotter than planned. This is often due to aiming for the FRB to remove all the long term fuel load in one burn rather than a staged approach. It is also due in part to the staff not adapting to two factors :
  - ✓ The available fuel for the FRB in recent years is the normal fine fuels (leaves and twigs) but also much of the heavy fuel (branches and logs) due to the drought conditions.
  - ✓ Drier burning conditions.
- Both of these factors require an adaptive approach when burning takes place – later in the day, later in the season, multi stage burning or changed lighting patterns.
- Regardless of the fact that some FRBs may have been too hot in recent years :
  - ✓ They have played a significant role in protecting communities.
  - ✓ They do not burn the gully systems so there is still protection of riverine ecosystems.
  - ✓ They do not burn the duff layer as intense wildfires do.
  - ✓ They do not burn 100% of the area so there are still islands for wildlife etc.
  - ✓ In comparison, the alternative is a large high intensity uncontrolled wildfire possibly with a crown fire burning 100% of everything.
- It should be noted that when an area is burnt by a large mega fire, any recent FRB area (even if it was hotter than planned) becomes the only green refuge for wildlife. There are numerous examples of this in East Gippsland following the recent fires – see photo 7 as an example.

Photo 7 - Princes Hwy at McKenzie River (between Orbost and Cann River) looking west. Main fire front burning from the NW (top right) burnt all bush in the area except the area on the right which was fuel reduced two years ago. It is the only remaining green bush in the locality

6) **Areas subject to an FRB will burn again**
   - Those who use this argument against a broad scale FRB program do not understand the intent of the program which is to set up a mosaic of burnt and unburnt country of varying ages to reduce fire intensity and rate of spread and to assist in the fire suppression operations.
   - A very recent FRB cannot burn again (no fuel= no fire). – see photo 3
   - However fuel will build up over the years following a FRB and the area will burn again. The issue is at what intensity it will burn. For instance if an unburnt bush carries 12 tonne/hectare of available fuel and an adjacent area recently subjected to a FRB has built up to 4 tonne per hectare then the recently burnt area will burn at one ninth the intensity of the unburnt area. This will almost certainly ensure that there will not be a crown fire and the subsequent ground fire will be controllable with ground resources.
   - The key is that the fire is less intense and hence environmental damage is lessened.

7) **FRB causes smoke which may cause health issues and is annoying**
   - It cannot be argued that FRB operations do not generate smoke over a period of days or weeks depending on atmospheric conditions. However there is a relatively low level of smoke and embers generated in comparison to a bushfire burning over a period of months as has recently occurred.
   - The smoke from a FRB can be controlled to some extent by when burns are planned and the anticipated weather conditions as compared with the intense smoke from wildfire which is uncontrolled and unplanned in area and time.

8) **FRB causes species extinctions**
   - Diversity of habitat is the most important factor in ensuring the survival of species.
   - A broad scale FRB program creates a mosaic of burnt and unburnt forest with varying ages since burn. The diverse range of habitats that this creates is an aid to species survival particularly in

comparison to the impacts of mega fires which burn 100% of large tracts of habitat and remove all diversity.

- Many research projects have provided no evidence of loss of a components of diversity through FRB.
- Research indicates that FRB certainly can change the species abundance on some sites but no species have been recorded as becoming extinct due to FRB.

9 Discussion

A broad scale fuel reduction burning program is not designed to stop wildfires. The purpose is to make them easier and safer to control and to reduce their impact on the environment and communities and their assets.

Reducing fuels works with nature rather than trying to control nature. The natural scheme of fuel management was regular burning of the vegetation through lightning strikes (and aboriginal burning) which created a mosaic of burnt and unburnt land. Therefore when a wildfire occurred under extreme conditions its forward progress was slowed and the environmental damage was limited. A broad scale FRB program seeks to duplicate this outcome.

To be effective, a FRB program needs to be across the landscape and burn between 5% and 10% of the landscape each year.

Opposition to fuel reduction burning ignores the difficulty of fighting wildfire in extreme conditions. The only option available to land managers within the fire triangle is the manipulation of fuel loads. In extreme wildfire conditions a direct attack is futile and this can also be the case in areas where there have been FRBs, however the moderating effect of fuel reduction activity is profound, and is very important during periods of the day when extreme fire behaviors wane. FRBs across the landscape allow land managers greater flexibility and more options to suppress wildfire.

10 Summary

We have a choice. We can continue with the current policies and at regular intervals have large intense fires with the resulting loss of life, assets and ecosystems or we can work with nature and reduce fuel loads over large areas of the forest.

The irony is that to refuse to burn large areas of forest in a mosaic planned manner eventually results in the destruction of whole ecosystems and loss of life and assets in massive uncontrolled infernos. In recent history we have allowed this to occur over and over again.

If we do not try to modify fuels to change fire outcomes then what are we going to do? To continue with the status quo is to accept more of the same outcomes with the same impacts on communities, community assets and the environment.

We need to act because more of the same is not acceptable.

Root Cause Analysis - The issue : Large intense fires which cannot be controlled even with all the ground and air resources available